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Technical Association Meets At Ann Arbor

Entire General Program of the Fall Meeting Held On the Campus of the University of Michigan Featured Part Pulp and Paper Industry Is Taking In National Defense — Those In Attendance.

[FROM OUR SPECIAL REPRESENTATIVE]

ANN ARBOR, Mich., September 22, 1941—Following the practice of the past few years the Technical Association of the Pulp and Paper Industry held its fall meeting in the academic atmosphere provided by a university. This year the meeting was held on the campus of the University of Michigan at Ann Arbor, Mich. on September 16-19, 1941. Last year the meeting utilized the facilities of the University of Washington and in the two preceding years the New York State College of Forestry at Syracuse and the Institute of Paper Chemistry at Appleton, Wis. cooperated. There were about 600 present.

Active Local Committee

As in the past, members in Michigan devoted considerable time to organizing the program and carrying out the numerous arrangements under the general chairmanship of Ralph A. Hayward of the Kalamazoo Vegetable Parchment Company. Associated with him as vice chairmen were Donald W. McCready of the University of Michigan and W. Kent Kidder of the Bryant Paper Company. The following were chairmen of special committees: John Wood of the K.V.P. Company (Administration, Finance and Accounting); E. Frank Whittington, Rex Paper Company (Registration); Milton R. Bailey, Bulkley, Dunton Pulp Company (Publicity and Printing); Paul de Guehery, Michigan Paper Company (Railroads and Local Transportation); R. L. Barton, Michigan Paper Company (Mill Visits); Harry D. Eliason, Johaneson, Wales & Sparre, Inc. (Ladies) and W. A. Kirkpatrick, Allied Paper Mills Company (Entertainment).

Preconvention Program

On Monday, September 15, there was open house in all of the Michigan mills. A large group visited the Kalamazoo Valley mills, in particular.

The TAPPI Executive Committee met at the Michigan Union and a dinner meeting was held for the convention committeemen. Following this motion pictures were shown of recent football games of the University of Michigan teams.

Meetings of Tuesday, September 16

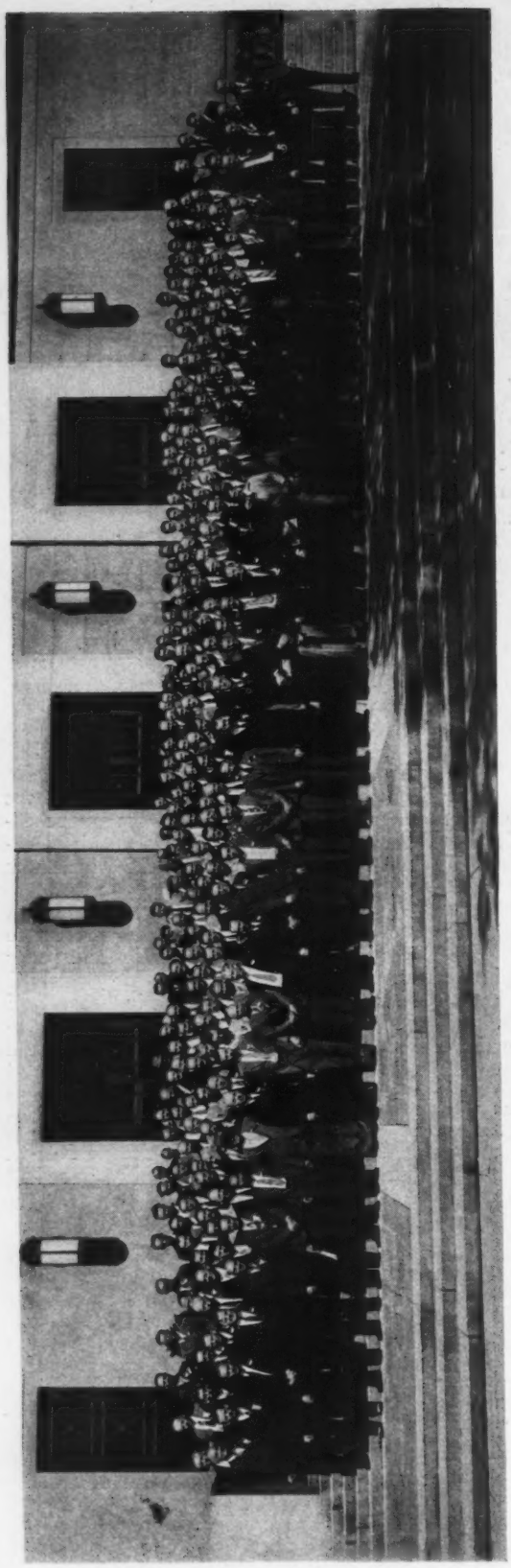
Ralph A. Hayward presided at the first general session held in the lecture hall of the Rackham Building, on Tuesday, September 16, and called on Ivan C. Crawford, dean of the College of Engineering of the University of Michigan. W. H. Swanson, president of the Technical Association responded.

D. C. Everest Makes Statement

D. C. Everest Advisor on Pulp and Paper to the Office of Production Management was the first scheduled speaker on the program but was unable to attend. He sent the following statement which was read by Mr. Hayward:

I regret sincerely my inability to be present at your meeting. I had hoped to be able to present to you the situation in relation to the pulp and paper industry as it exists today.

When I spoke to you in New York in February I outlined many of the things which the Office of Production Management thought would happen in the future. Unfortunately all of these things developed faster than anticipated and extended into many items which were not anticipated at the time. It is well to remember that having shortages occur in civilian supply is only an indication of the progress being made in defense supply. Up to a comparatively short time ago but little of our paper and paperboard products entered into defense use, and there was but mighty little being spent for defense or even the bare maintenance of the Army and Navy. Since June 1940 this picture has changed and there has been a constantly increasing amount of our products entering into direct and indirect defense items. This, in my opinion, is only the beginning. The estimated demand for 1942 is staggering. It will require all the technical and engineering brains in the industry to cope with this situation. Heretofore, I have always been urging the development of new products. This situation may also entail research and development, but perhaps along different lines. We must now start with basic raw materials, pulp wood, rags, straw and waste paper and make these go as far as possible in the production of the resultant pulps. Having these pulps



PICTURE TAKEN AT ANNUAL FALL MEETING OF THE TECHNICAL ASSOCIATION, ANN ARBOR, MICH., SEPTEMBER 15-19, 1941.

we must again make them go as far as possible in producing paper and paperboard. Regardless of the fact we sell our products by the pound, everything entering into packaging or printing is sold by the square foot. A book, magazine or box is square feet of surface. The technicians of all paper and paperboard conversion plants must find some way to reduce the basis weight of material or the size of the article thus extending the square feet coverage. This will probably cut down the tonnage production of the machines but it gives more coverage per ton of pulps used and this is what must be done if we are to come within shooting distance of supplying the demand from now on.

I also urge you to survey your own methods of packaging and endeavor to effect every possible economic saving you can make.

Those of you who are engaged in pulp manufacturing should do everything possible to increase digester yield per day. It may seem silly to suggest some of these things to a very able and intelligent group of technical people, but this whole thing has developed so rapidly that some people engaged in their regular business have not yet realized the seriousness of the situation. I wish to emphasize that it is serious and that never before in the history of this country have we been in such a desperate situation with relation to our supplying the country's demand both for defense and civilian use.

I regret not being able to present the situation in person, but Mr. McKenna, Chief, Pulp and Paper Branch, will be with you Wednesday evening and will tell you the whole story.

I again urge you to do everything possible to assist us in the conservation of the use of pulps, paper and paperboard and knowing your ability to make "two blades of grass grow where one grew before" I am confident you will contribute everything you have in an "all out" effort to help us.

National Defense Program

It should be noted that the entire general program featured the part that the paper industry is taking in the national defense program.

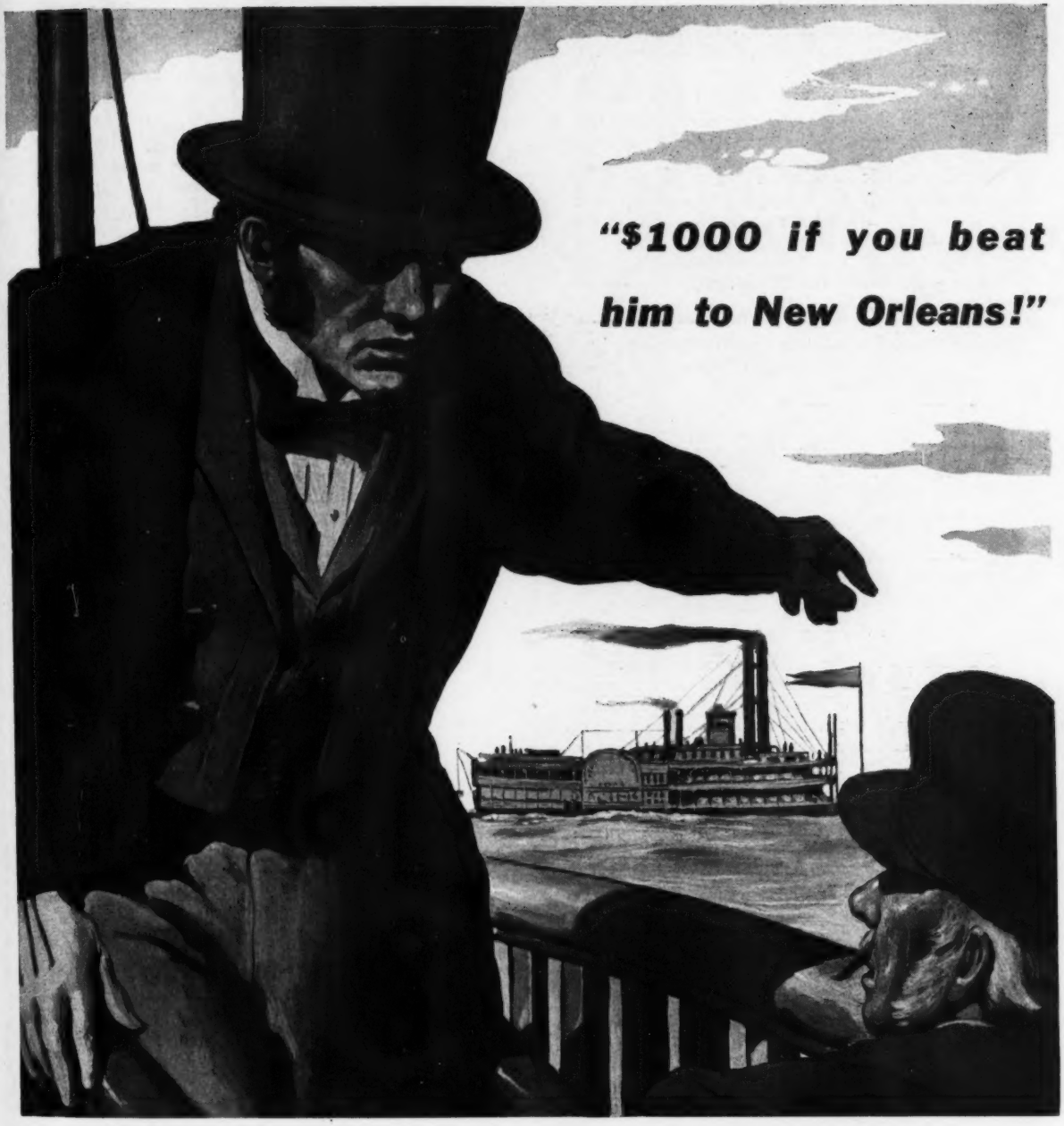
The principal address was made by Virgil Jordan, President of the National Industrial Conference Board on "Current Economic Tendencies and Conditions in This Country."

Following a luncheon the meeting reconvened in the Rackham Building under the chairmanship of W. Kent Kidder of the Bryant Paper Company.

Ranson S. Hawley Speaks

The first speaker was Ranson S. Hawley, chairman of the Department of Mechanical Engineering of the University of Michigan, who talked on "Making the Best Use of Existing Power Equipment". Dr. Hawley made the following recommendations: Purchase the coal that is most suitable for your equipment; Use care in handling coal; Keep boiler heating surfaces clean; Instruct operators in the use of automatic combustion control equipment; Conserve condensate; Analyze the steam and power demands in the several departments of the factory; Treat feed water scientifically.

The next speaker was Phelps Vogelsang of the Dow Chemical Company, Midland, Mich. who discussed "Hybrid Poplars". This paper relates to research work on growing hybrids in Bay and Mid-



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land Counties in Michigan. The study includes careful checking on mortality, growth rate, disease and insect resistance, plant habits and chemical and physical analysis of the wood.

C. W. Rivise, Patent Attorney, Philadelphia, Pa. read a paper on "Patents". Mr. Rivise points out the change in attitude of the courts in regard to the status of a patent. In the past the inventor was considered a public benefactor but more recently they look upon a patent as a phase of monopolistic control. There is a need for industry to encourage invention and to respect the patentee's exclusive right in his invention. The patent laws should be sympathetically and liberally administered.

E. F. Barker Gives Lecture

E. F. Barker, chairman of the Dept. of Physics of the University of Michigan gave a brief lecture on the electron microscope and spectrographic analysis and the cyclotron. This was followed by a demonstration of the new equipment at the University. The University of Michigan has recently acquired an electron microscope of the latest design, manufactured by the R. C. A. With it objects may be viewed and photographed under magnifications of at least ten times as great as any obtained with a microscope employing visible light. This makes possible observation of the most minute organisms and even of some of the larger molecules.

Pacific Section Gets Hercules Cup

At 3:30 P.M. there followed the daily recreational period, during which the local sections competed in golf, softball and other athletic tournaments. A feature of the golf tournament was the awarding of the Hercules Challenge Cup donated by the Hercules Powder Company to the Pacific Section of TAPPI.

The evening program was devoted to dinner, dancing and "Carnival Night" in the Michigan Union Ballroom. Fifteen games of skill taxed the competitive ability of those present and literally hundreds of prizes were given away.

During the evening the Defense Reporter of the National Association of Manufacturers broadcast a program from the Detroit Sulphite Pulp and Paper Company featuring the work being carried on by the industry in the interest of defense.

Meetings of Wednesday, September 17

The meeting again convened in the Rackham Building under the chairmanship of W. H. Swanson of the Kimberly-Clark Corporation and President of the Technical Association. Again the general theme was "Defense and the Paper Industry".

John L. Riegel of the Riegel Paper Corporation and President of the American Paper and Pulp Association and E. W. Tinker, Executive Secretary of the A.P.P.A. discussed the work and problems being handled by the American Paper and Pulp Association to meet the current needs of the industry.

H. F. Taggert of the Office of Price Administration discussed "Price Control Policies".

Following a brief recess W. Haber, Professor of Economics of the University of Michigan discussed "Post War Economic Problems".

General Interest Meeting

Following the luncheon five group meetings were held. One of these on a subject of general interest was presided over by Mrs. S. J. Dana of the University of Michigan. The speaker was O. R. Yoder, Medical Superintendent of the Ypsilanti State Hospital of Ypsilanti, Mich. who took as his subject "Keeping Your Balance". Dr. Yoder outlined the extensive use of propaganda by nations at the present time to produce war psychosis. He advocated the need of maintaining mental resilience and fortitude during this period. Attention should be given to our spiritual and physical well being.

Fundamental Research Session

Harry F. Lewis of the Institute of Paper Chemistry presided at the session on fundamental research.

W. O. Kenyon of the Eastman Kodak Company Research Laboratories discussed the Oxidation of Cellulose by NO_2- N_2O_4. It has been found that nitrogen dioxide oxidizes cellulose to produce a new type of oxidized cellulose having novel characteristics. These new materials appear to be composed of anhydro-glucoronic acid and anhydroglucose units. Above a certain degree of oxidation, these oxidized celluloses dissolve quickly and completely in dilute aqueous solution of organic or monovalent inorganic bases. With polyvalent cations, insoluble salts are produced.

T. A. Howells of the Institute of Paper Chemistry presented a paper on the "Cellulose Cuprammonium System and the Presence of Pectin in Wood Pulp". Contrary to the theory wood pulps are found to be almost entirely soluble in cuprammonium hydroxide. The resultant viscosity and swelling behavior were unaffected by pectin solvents with the exception of acids.

H. J. Hajny and G. J. Ritter of the Forest Products Laboratory, Madison, Wis. presented a "General Report on Holocellulose Research". This report brought up to date the record of the work done on this TAPPI financed project. High-alpha pulps in yields of 49% of the wood and having high cuprammonium viscosities have been prepared from refined semi chemical pulps and holocellulose.

G. Edward Ahlm of the Institute of Paper Chemistry read a paper (by title) on "An Investigation of Spruce Thiolignin".

Sizing Session

F. L. Chappell, Jr. of the Sutherland Paper Company presided at a session on sizing.

B. W. Rowland, H. L. Davis and T. T. Collins, Jr. of the Institute of Paper Chemistry read a paper (by title) on "The Behavior of Alumina in Relation to Sizing".

W. P. Dohne and C. E. Libby of the New York State College of Forestry discussed "An Investigation of Rosin Size Precipitation and Its Effect on the Sizing and Strength Properties of Paper".

W. H. Bigelow of the Plaskon Company reported on "Urea Resins in the Pulp and Paper Industry". This paper dealt with the use of these plastic materials for developing high wet strength in papers. It also considered some of the properties needed in pulp when it is used as a filler in plastic.

J. P. Strasser of the Stein-Hall Manufacturing Company discussed "Surface Sizing". This related largely to the use of starches for this purpose.

Acid Pulping Session

W. A. Swanson of the Kimberly-Clark Corporation presided at the session on sulphite or acid pulping.

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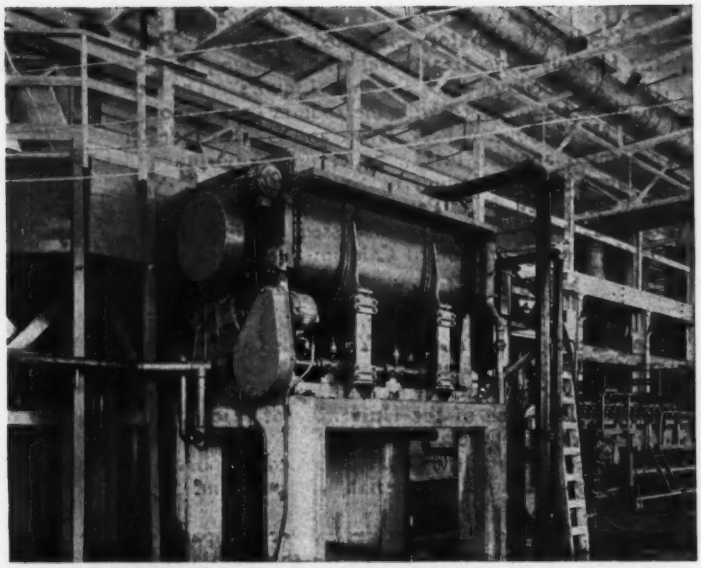

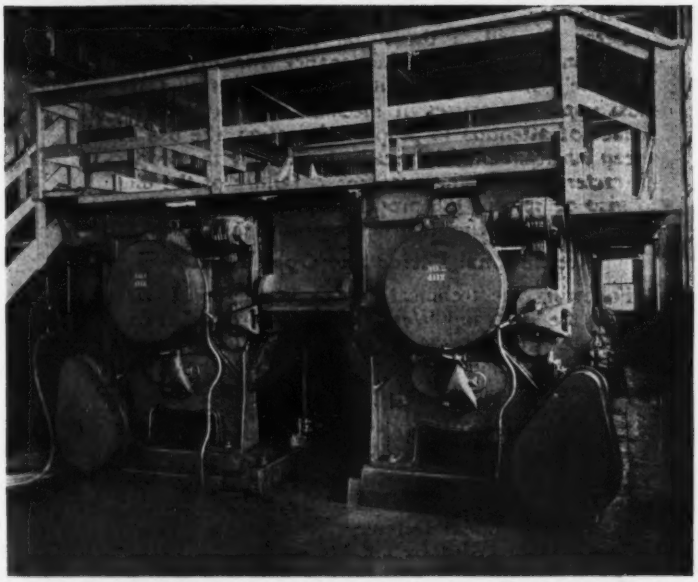

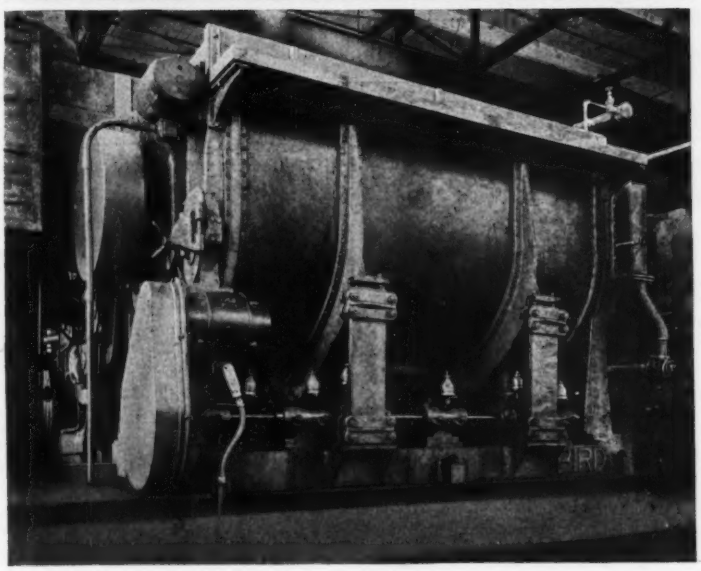

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J. N. McGovern and G. H. Chidester of the Forest Products Laboratory presented a paper on "Pulping Loblolly Pine Heartwood with Calcium, Magnesium and Sodium Base Sulphite Liquors". The best results were obtained with the sodium base liquor.

J. N. McGovern, J. N. Evert and G. H. Chidester presented another F.P.L. paper on "Absorption of Sodium Sulphite Liquor by Sweetgum Chips".

A. J. Bailey, I. A. Pearl and H. K. Benson of the University of Washington discussed "Further Studies on the Desulphonation of Calcium Lignosulphonate".

Materials of Construction Session

James A. Lee of Chemical and Metallurgical Engineering, New York, N. Y. presided at the session on construction materials.

A. E. White, Director of the Department of Engineering Research of the University of Michigan reported on "The Metals Situation".

Col. G. Brady of the OPM discussed the possibility of using "Substitute Materials" in pulp and papermaking.

A. R. Olson of the Hercules Power Company discussed "Maintenance Coatings for the Pulp and Paper Industry".

Percy Tigwell of the Beloit Iron Works read a paper on "Preventive Maintenance for the Paper Machine". In this paper it is pointed out that the most important causes of mechanical difficulties are 1. lack of attention to proper lubrication, the use of cheap lubricants and lubricants not having the proper characteristics for the purpose; 2. failure of the mill to give equipment the proper inspection and 3. lack of detailed operating instruction to the mill.

Recreational Period and Open House

Following the technical sessions open house was held in the East and West Engineering Buildings to inspect the apparatus used in engineering laboratory work. Intersectional golf and softball tournaments were continued.

Dramatic Presentation

Following dinner the evening program was featured by a dramatic program in the Lydia Mendelssohn Theatre on "The Service of the Pulp and Paper Industry in National Defense".

This was preceded by an address by Norbert A. McKenna, Chief of the Pulp and Paper Section of the OPM on the general policy of the OPM and the philosophy that motivates its action.

GLENN STEWART, KVP AD-MAN, TRIES ON BEN FRANKLIN COSTUME; IS A BIT UNDECIDED ABOUT THE "BIB."

Meetings of Thursday, September 19

Dean Ivan Crawford of the University of Michigan presided at the general session.

Samuel L. H. Burk of the OPM and formerly Personnel Director of the Atlantic Refining Company talked on "Labor Relations".

Following the luncheon a number of group meetings were held.

General Interest Meeting

Milton R. Bailey of the Bulkley, Dunton Pulp Company presided and Arthur Secord of the University of Michigan talked on "Personality in Selling".

Pulp Purification Session

D. T. Jackson of the Hammermill Paper Company presided at a symposium on "The Determination of Oxidizable Materials in Pulp (Bleachability), Liquors and Wash Waters".

T. A. Pascoe and H. E. Nelson and Marian Fraser of the Nekoosa-Edwards Paper Company, Port Edwards, Wis. read a paper on "The Relation Between Bleachability Test Data and Other Pulp Characteristics". This paper indicates that bursting and tensile strength increases with increasing hardness in the range of conventional pulps. Tearing resistance may

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A salute to

TAPPI

We feel that the Nation and the Paper Industry can well be proud of TAPPI on the occasion of its 25th Anniversary. Your constant progress through united effort and your unselfish cooperation in a common cause are a particularly fine and timely example of "The American Way".

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steadily decrease or rise to a maximum and then decrease with increase in pulp hardness. Beating time to a given freeness increases with increasing pulp hardness. These relations hold for both sulphite and sulphate pulps.

Rex Vincent of the Bulkley, Dunton Pulp Company discussed "The Use of Bleachability Tests in Marketing Pulp".

B. L. Browning and G. D. Knight of the Institute of Paper Chemistry reported on "A Study of Bleachability Methods". Removal of soluble materials by any solvent applied results in a decrease in permanganate number. Corresponding changes in the chlorine number were less and those of hypochlorite bleach consumption are greater than the permanganate number changes.

J. C. Tongren of the Hammermill Paper Company made "Some Observations on Loeschbrandt's Method of Determining Oxidizable Materials".

John D. Rue gave a brief summary of the replies to the questionnaire on "Operating Control of Pulp Bleaching" sent out by the Association.

Coating Session

W. A. Kirkpatrick of the Allied Paper Mills presided at the Coating Session.

F. C. Peterson, Myron Kin and R. M. Upright of the Dow Chemical Company read a paper on "The Evaluation of Methocel as an Adhesive for Paper Coatings".

Howard F. Roderick of the Michigan Alkali Company discussed "New Adhesive Economics in the Use of Calcium Carbonate".

Curtis R. Singleterry of Glenn Davidson, Inc., Aurora, Ill. presented a paper on "Microscopic Observations of the Bonding Zone of Paper Coatings". The observations of the author indicate that the decisive factor in the attachment of the coating is probably the mechanical strength of the coating or a special zone in the coating, as opposed to the pure interfacial adhesion of the actual coating fiber boundary.

H. C. Speel of the Atlas Powder Company reported on the use of "Sorbital and Other Polyalcohols in Glue Coatings". The useful physical properties of the major commercial alcohols—ethylene glycol, glycerol and sorbital—are controlled primarily by the number of hydroxyl groups. Sorbital is higher than the three hydroxyl glcyerol and the two hydroxyl ethylene glycol. Volatility, hygroscopicity, density, organic solubility and refractive index follow the same relative patterns.

Biological Control in Paper Making Session

Allen Abrams of the Marathon Paper Mills, Rothschild, Wis. presided at the Bacterial Control Session.

J. N. Appling of the Institute of Paper Chemistry reported on the research work being done in this field at the Institute. This covered such subjects as felt rotting, slime, toxicity studies and the use of the electron microscope.

J. A. Holmes of the National Aluminate Company reported on "Experiences in Slime Control in Paper Mills".

Miss Olga Smith of the Institute of Paper Chemistry discussed "The Microflora of Felts and Slimes". Thirty-nine species of organisms have been isolated in mill felts. About half of these attack felts, some impairing felts in a few days.

Testing Methods Session

W. F. Hathaway of the Kalamazoo Vegetable Parchment Company presided at this session.

M. Heinig and P. K. Baird of the Forest Products Laboratory presented "A Direct Method of Measuring Surface Roughness of Papers".

C. O. Seborg and F. A. Simmonds of the Forest Products Laboratory discussed the "Measurement of the Relative Stiffness in the Bending of a Single Fiber".

John Graff of the Institute of Paper Chemistry reported on "Stain Reactions of Pulps Exposed to Ultraviolet Light".

A. H. Croup and E. W. Samson of the Hammermill Paper Company reported on "Consistency Tests and Packing Characteristics of Pulps".

Recreational and Theatre Programs

Following these technical sessions athletic competition continued and the football practice of the University of Michigan football team was reviewed.

The Kalamazoo Civic Players featured the evening program at the Lydia Mendelssohn Theatre in offering "The Male Animal" an interesting and appropriate play.

Activities of Friday, September 19

Having a meeting in the famous Detroit automobile manufacturing area provided the opportunities to inspect the plant of the Ford Motor Company in Detroit where the motor assembly, steel plant and other departments were inspected.

This was followed by a visit to Dearborn, Mich. where the remarkable exhibits of the Ford Industrial Museum at Greenfield Village were seen.

The Women's Program

At but few Technical Association meetings have the ladies present had such an opportunity to get as much of real value as at this Ann Arbor meeting.

Among the lectures attended the following speakers were heard:—Virgil Jordan of the National Industrial Conference Board on "International Economics"; Alice Lloyd, Dean of Women, University of Michigan on "Youth's Perplexities in 1941"; Olive Dean Hormel of the University of Michigan Extension Service on "A Preview of the New Books"; Wesley H. Mauer, Associate Professor of Journalism, University of Michigan on "Rare Moments in the Garden", illustrated with colored pictures.

There were informal teas in the Garden of the Michigan League and, of course, the opportunity to share with the men the trip to Detroit, the plays at the Lydia Mendelssohn Theatre, musicals, the Carnival Night, etc.

On Wednesday they heard Professor Haber's lecture on "Post War Economic Problems" and Dr. O. R. Yoder's talk on "Keeping Your Balance".

On Thursday, William B. Stout, President of the Stout Engineering Laboratories, talked on the "Romance of Research"; Mrs. J. K. Pettingill, past national chairwoman of the Parent-Teachers Association talked on "The Family as the Threshold of Our Democracy" and Elzada Clover, Instructor in Botany of the University of Michigan reported on her "Trip Down the Colorado River".

Sponsors of the Carnival

The following are responsible for the success of the Carnival:—Acme Steel Company, American Cya-

namid and Chemical Corporation, Bird Machine Company, Beloit Iron Works, Black Clawson Company, Cameron Machine Company, Clinton Company, E. I. Du Pont de Nemours & Co., Geigy Company, Inc., Heppenstall Company, Hooker Electrochemical Company, F. C. Huyck & Sons, Johns-Manville Corporation, Michigan Alkali Company, Moore & Munger, Morey Paper Mill Supply Company, National Aniline and Chemical Company, National Oil Products Company, The Orr Felt & Blanket Company, Oliver United Filters, Inc., Paper Makers Importing Company, Edgar Brothers Company, Penick & Ford, Ltd., Permutit Company, Rice Barton Corporation, J. O. Ross Engineering Corporation, A. E. Staley Manufacturing Company, The Waterbury Felt Company, Williams Gray Company, General Electric Company, Stein-Hall Manufacturing Company, Dorr Company, Inc., Noble & Wood Machine Company, Socony-Vacuum Oil Company, Mathieson Alkali Works, Frank B. Eilers, Appleton Woolen Mills, B. F. Perkins & Son, Pittsburgh Plate Glass Company, Shuler & Benninghofen, Hercules Powder Company, General Chemical Company, and "A Friend".

Papers in Technical Section

Many of the papers presented at the Convention will be found in the Technical Section of this week's issue of the PAPER TRADE JOURNAL beginning on page 85 and others will be printed in later editions.

Current Problems of the Pulp and Paper Industry*

By E. W. Tinker[1]

National Defense Program

Consideration of the current situation and prevalent problems of the paper and pulp industry necessarily involves extraordinary conditions created by the National Defense Program. In reviewing these problems it would be well to look at the industry's record since the initiation of the defense program. I believe the record will indicate that this industry has recognized these problems as they arose and taken remedial action that has resulted in a maximum contribution to the defense program and to the stability and welfare of the industry itself. The pulp and paper industry is one of the first, if not the first industry, to feel the direct impact of the European wars. With the beginning of naval warfare and later the invasion of Scandinavia, the normal shipping of pulp supplies, upon which domestic mills are so dependent, was disrupted and shipments rapidly dwindled to the vanishing point. The law of supply and demand reacted immediately and so dramatically on the domestic industry that the situation was early recognized by the National Defense Advisory Commission. Across the table discussions of the problems involved resulted in the establishment of policies on the part of individual companies that still prevail. In some respects I think it can be assumed that the action taken at that time sets the pattern for similar action in relation to other industries and in relation to similar problems within the paper industry itself.

The economic distortions, that were inevitable in connection with the tremendous defense program and the vast expansion of war industries involved, have necessitated rapid adjustments within the paper and pulp industry as in other industries. These adjustments have been made in every instance, so far as I know, on the basis of necessity and with understanding of public objectives and implications with respect to the public welfare. The pulp and paper industry may be a little unique in one respect. Employer and employee relationships are such that management within the industry feels keenly its responsibility for continuity of employment. As conditions, because of changed cost-price relationships, made it necessary to make adjustments in order for the industry to continue to operate, maintain employment, and meet civilian and military requirements, changes have been made but always with full understanding and consideration of the industry's responsibility in the general pattern of our national economy.

Any reasonable presentation of the current and complicated problems of the industry would require a lengthy statement. The existing and potential situation in relation to the fibrous raw material supply is of acute interest. The impact of the withdrawal of a considerable percentage of the normal supply of chlorine available to the industry has presented an extremely difficult and complicated problem with which the industry is now struggling. Lack of a solution will bring about chaotic conditions in the marketing of paper which will not only injure the industry but will result in consumer loss as well. The pulp and paper industry, operating at capacity, is tremendously concerned with obtaining necessary repair and replacement parts under the prevailing priority system. It is freely predicted that if some plan cannot be developed and approval obtained, a considerable loss in production is inevitable in 1942, and this *the country cannot afford*. Parallel with the problem of metal supplies is the question of processing materials and furnish. As a chain is only as strong as its weakest link, so full production is dependent upon a coordinated plan that will make available to the industry all of the elements required for maximum operation. The transportation problem, both with respect to adequate shipping and available cars of all descriptions, may prove a bottleneck that will seriously affect the industry's accomplishments.

Cooperation and Coordination Essential

The American Paper and Pulp Association is endeavoring to cooperate, not only with government agencies interested in maintenance of civilian and military paper requirements, but is endeavoring to anticipate the exigencies that may arise and develop plans for the avoidance of emergencies in as far as possible.

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* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Ann Arbor, Mich., Sept. 16-19, 1941.

[1] Member TAPPI, Executive Secretary, American Paper and Pulp Association, New York, N. Y.

To illustrate a type of industry problem, let us consider one of the difficult situations I have mentioned. The industry is dependent upon certain metals, many of which are now under mandatory priorities. Stainless steel and copper are particularly essential to pulp and paper mill operations. In the case of metals, in cooperation with the machinery manufacturers, an inventory of the required supplies to maintain normal operations through availability of repair and replacement parts and equipment has been made. Some 800 suppliers are involved. From this inventory, it is expected to place in the hands of OPM officials the normal industry requirements, with the hope that provision will be made for the pulp and paper industry's continuous normal operation. Such an inventory and the compilation of the hundreds of items involved can only be accomplished through integrated cooperative effort and through industry consciousness of an overall industry problem. Under like necessity, an inventory is being made of the processing and engineering materials essential to the continued operation of the industry. In this case the information is being obtained from the mills themselves and here again, if the government agencies concerned feel that continued maximum production from the industry is desirable in the public welfare, some blanket priority rating for the materials must be given or operations will be materially curtailed. I have cited only two cases of the many problems with which the industry is faced.

The directorate of the American Paper and Pulp Association is seriously concerned with the performance of the industry operating under the stress and strains of the times. It is the belief that given reasonable consideration and cooperation the industry can do an excellent job in meeting both civilian and military requirements. Our analyses indicate this to be the case, particularly if cooperation from all concerned can be had to discourage speculative buying and the unwarranted building of excessive inventories, both within civilian industries and government agencies. We realize the difficulty of predicting potential demand during periods of emergency. We also realize that temporary shortages in one item does not mean a shortage in all. The thought occurs that the hue and cry about shortages may be contributing materially to their creation. The pulp and paper industry is now and will in the future operate at maximum capacity if it is given the materials to work with. It can do no more and I repeat that as a current problem the Association is most concerned with the maintenance of its high operating ratio and the obtaining of materials and supplies necessary to do so. It is concerned also with the avoidance of programs that will do irreparable injury to the industry and restrict future civilian use.

The paper industry has grown to its present enormous proportions on the basis of an economy of plenty. Expansion in the use of paper of all kinds has been based upon increased efficiency of industry operations and consequently upon a product at a cost within the means of every citizen. This has resulted in increased employment within the industry. It would like to continue after the emergency is over along this same line. It believes it can meet the present situation with only isolated instances of critical shortages and that, accepting the premises that defense requirements must take precedence, a little tightening of the civilian belt can be achieved without undue turmoil. All this in spite of the almost astronomical predictions of future military usage.

TAPPI Notes

The New England Section of the Technical Association of the Pulp and Paper Industry will meet at the Pittsfield Country Club on Saturday, October 4. There will be a golf tournament throughout the day. Following dinner Arthur Crane will give a talk on "Work Simplification".

The Papermakers and Associates of Southern California will meet at Scully's Cafe, Los Angeles, Cal., on October 2. A. R. Herron, personnel manager of the Crown-Zellerbach Corporation, will speak on Labor Relations. Walter Burroughs of the Prisina Products Company will discuss relief printing, planograph printing and intaglio. George Ford, manager of the converting division of the Fibreboard Products Company, will talk on boxboard printing.

The Pacific Section of TAPPI will meet at Everett, Wash., on October 7.

Joseph A. Staidl, formerly of the Panama City mill of the Southern Kraft Corporation, is now pulp mill superintendent for the Chesapeake-Camp Corporation, Franklin, Va.

John A. MacArthur, formerly of the Gaspesia Sulphite Company, is now in the engineering department of the Three Rivers mill of the International Paper Company.

The Priorities Division of the O.P.M. has announced its Research Laboratories Supply Plan. Any laboratory may under this plan secure an A-2 rating by applying to the Chemical Branch of the O.P.M. on form PD-88. Under this plan companies having research laboratories may expedite delivery of materials for their research projects, since the blanket rating of A-2 is probably higher than would be assigned otherwise.

Pulp Mill Fire Brings Law Suit

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—Fire losses paid to the Combined Locks Paper Company and the Green Bay and Mississippi Canal Company resulting from the destruction of the pulp mill of the former at Little Chute, Wis., February 9, 1940, are the object of a suit brought against I. Bahcall, Inc., scrap metal firm of Appleton, Wis. The case will be heard by Judge F. Ryan Duffy in federal court at Green Bay, Wis. this week.

Suit was brought by the Continental Insurance Company, Newark Fire Insurance Company, Phoenix Insurance Company and the World Fire and Marine Insurance Company. They charge that an acetylene torch carelessly used by a Bahcall employee in cutting up machinery sold to the firm by the Combined Locks mill caused the fire. The building was owned by the Canal Company, and contained a large amount of inflammable material owned by the paper mill.

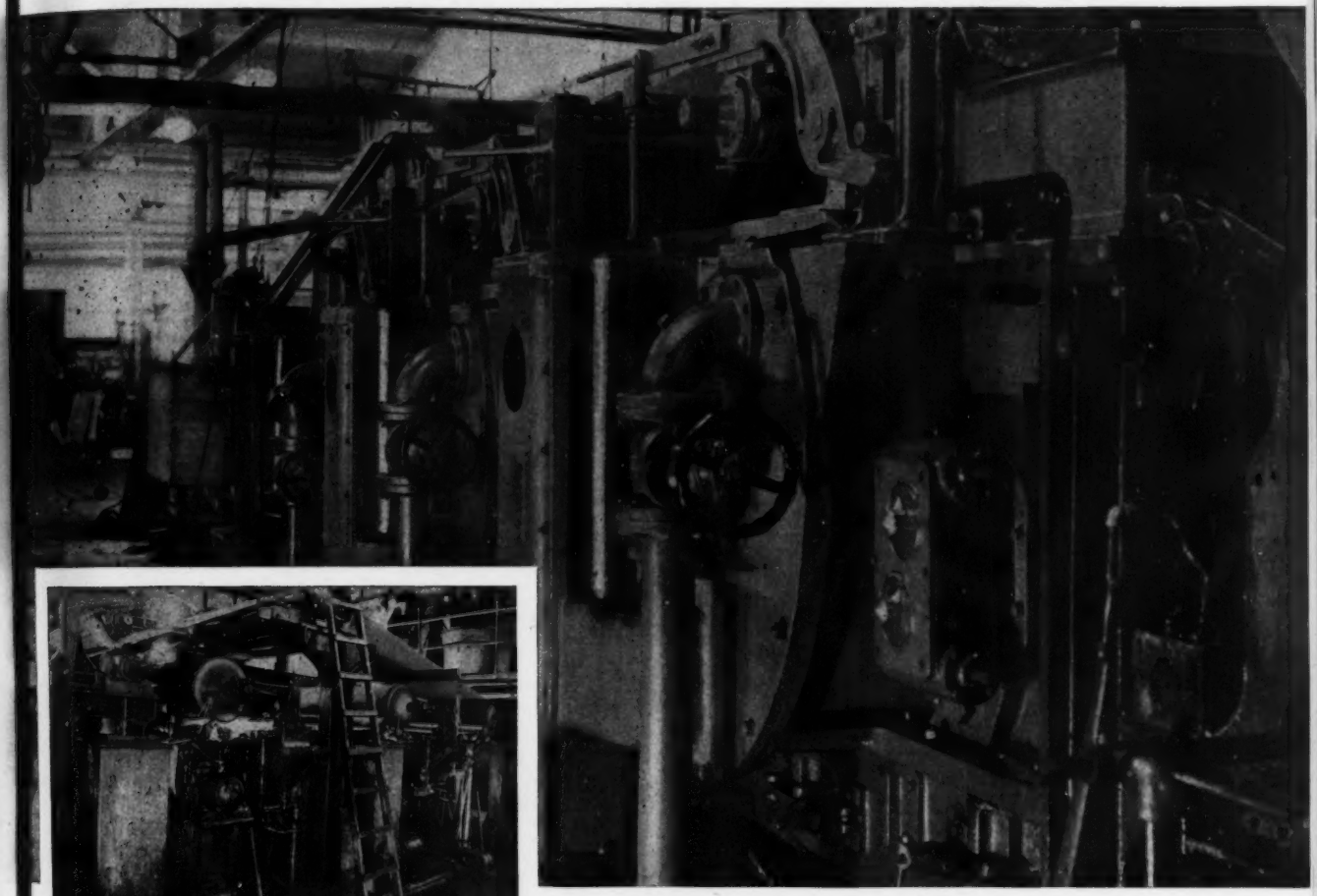
Paper Index for July Higher

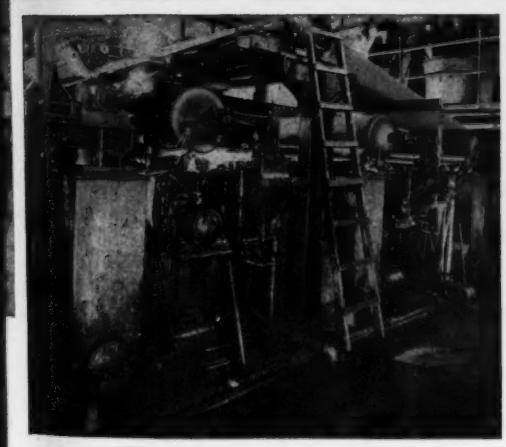
[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 24, 1941—July index of the value of paper mill inventories was 112.9 compared with 110.6 in June and 104.5 in July of last year taking December 31, 1938 at 100 according to the monthly business survey of the Department of Commerce.

Taking January 1939 at 100 the index of the value of paper mill shipments in July was 174 compared with 173 in June and 135 in July of last year.

FOOLPROOF FORMATION
with *"Stream-Flow"* Vat Systems





Stream-Flow Wet End of Cylinder Machine making Kraft and rope specialties. At left is the same machine before the Stream-Flow Vat System was installed.

The old makes way for the new . . . Again Stream Flow Systems break the formation bottle-neck and a mill making Kraft and rope specialties increases production on their most difficult grades up to 33% with greatly improved quality.

Prior to the installation of the Stream Flow Vat System, this cylinder machine was limited by formation much below dryer capacity. It now operates at full driving and dryer capacity, the driving speed is being doubled and the number of dryers increased 50% to take further advantage of the increased forming capacity of the Stream Flow Wet End.

Every day Stream Flow Vat Systems are proving their ability to give higher speeds, better formation, safer operation and greater profits . . . *Actually it is almost impossible to make a poor formation with Stream Flow Vat Systems* . . . Write us for further particulars.

A sheet is no better than its formation

THE PUSEY AND JONES CORPORATION

Established 1848. Builders of Paper-making Machinery. Wilmington, Del.

THE SIGN OF TRADE MARK SUPERIOR QUALITY

The Work of The American Paper and Pulp Association*

By J. L. Riegel[1]

A year and a half as president of the American Paper and Pulp Association has demonstrated to me time and again the vital function which the association fills in the economic structure of this major industry. You will be interested in knowing that it is the oldest national association in the country, having held consecutive meetings since 1878. As a matter of fact, rag paper manufacturers were cooperating on legislative matters in 1819. The normal functions of the association have covered a wide scope; possibly the widest of any trade association in the country as indicated by the award for its program for 1940 made by the organization of American Trade Association Executives.

Of Concern to All in the Industry

I know that most of you men, as technicians, have not been concerned with the work of the association and have, therefore, given the organization little or no thought. Nor is there any reason for you to do so since the association deals normally with the economic and management problems of the industry. The work of the association is, however, of concern to all of you, for in the long run individual management thought and company policy is crystallized into industry policy within the framework of the association. It is industry policy which determines to a major degree the conditions of labor, research, production and the other factors which affect the everyday welfare of all of us.

Before describing the work of the association, I will tell you of its organization. The A.P.P.A. is a federation of some 16 divisions. Paper and pulp mills are members of these divisions, and not of the parent association. This set-up has proved most advantageous, with the divisions concentrating on their internal problems, and the parent association on overall industry problems, and particularly on relations between government and industry.

There is, of course, the National Paper Board Association, which represents the manufacturers of paper board. This group is entirely distinct from the A.P.P.A., although cooperation in overall industry operations is frequent. The Newsprint Manufacturers Association of the United States is a distinct organization, not a divisional member of the A.P.P.A., but it is affiliated.

Staff of the Association

The staff of the A.P.P.A. consists of the executive secretary, Mr. Tinker, 4 assistants, and 12 other employees, 17 in all.

The work of the association can ordinarily be divided into several major classifications, legislative matters, industrial relations, statistics, cost and accounting, traffic problems, forestry, economic research, special problems; and at the present time, national defense. Let me run briefly through some of these major classifications.

The Matter of Legislation

First, in the matter of legislation, by the very organization of our Congressional representation, each legislator is responsible to his district or state for protecting and furthering its interests. Over the course of a year's time, every major national industry faces introduced legislation which, while aimed at benefitting one geographical section or group of people, would penalize the industry and the nation as a whole if the legislation were enacted. In the recent past, the paper and pulp industry has been faced with any number of vicious congressional bills such as H. R. 99 and H. R. 15. The former bill would have required the paper industry to consume a substantial portion of the cotton surplus or pay the penalty of a heavy tax, regardless of whether or not new cotton was technically suitable for paper manufacture and completely ignoring the factor of costs. H. R. 15 proposed a gigantic economic investigation of the paper and pulp industry; an investigation for which no real reasons could be determined. In the normal course of its work, the association presented the industry's case and side of the picture to members of Congress and the bills were defeated before they ever reached the floor of Congress. Such work is, of course, an impossible task for the individual company.

There are now pending in Congressional Committee two bills designed to place under strict government regulation, with power concentrated in the hands of one individual, all privately owned forest lands in the country. I need not point out to you that the control of the raw material resource means control of the industry. This legislation is being carefully studied and the industry's case in opposition is being prepared for presentation. These are only three samples of the type of legislation with whih the industry is faced, but they suffice to show the association's function in this field. There has, of course, been a temporary stop to the usual flood of legislation since national defense matters now occupy the time of Congress. In this we are fortunate, for at least half the time of the association staff is now occupied with defense created problems which affect the industry.

Industrial Relations

In the field of industrial relations, the work of the association covers a wide variety of activities. Among these are the analysis of union agreements, surveys of wage rates, monthly and quarterly reports showing trends of wages and hours, and general educational activities such as development of apprenticeship programs in the industry. Time does not permit my describing these activities in detail, but I merely wish to say that the individual company industrial relations can only be sound as the practices prevailing in the industry are considered by company management.

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Ann Arbor, Mich., Sept. 15-19, 1941.

[1] President, American Paper and Pulp Association; President and General Manager, Riegel Paper Corp.

The statistical work of the association has been developed over a long period of years. Records of capacity, production, raw material costs, wage rates, and all other industry data needed to an intelligent understanding of the immediate and long-run status of the industry are compiled for the necessary time periods and transmitted to management promptly. An integral part of this program is the annual survey of financial conditions in the industry. The value of this material to management as a basis of comparison and for development of company policy is obvious, but from an overall industry viewpoint this material has proven invaluable in the hands of the Association in its dealings with Government.

There is constant improvement in the presentation of these statistics to the industry. Examples of this are the weekly industry production ratio which all of you probably watch. You should glance each month at the monthly statistical summary. It contains a graph of paper production, orders received, and stocks on hand, together with a brief article and chart of some matter of major interest to the industry. The latest addition is the Monthly Wood Pulp Data, which condenses in two charts the supply, consumption and inventory of pulp.

The Field of Cost Accounting

In the fields of costs and accounting the association maintains as an integral part of its organization a department known as the Cost-Engineering Service. An eminently well-qualified consultant with the assistance of a staff member of the association is constantly engaged in advising companies with regard to the best prevailing cost and accounting practices in the industry and in installation of systems. Because the association absorbs the overhead, this work can be done at a minimum of cost to the company. Since a company can only act intelligently as it knows its costs, this work is of value to the entire industry.

The traffic work of the association under the able guidance of its traffic committee is too technical and involved for me to discuss. Suffice to say, however, that with the recent accomplishments in paper and paperboard freight descriptions, this industry is now in rather a satisfactory position from a transportation angle. At the present time a program is being considered to have paper and pulp given a high priority rating among civilian goods for transportation purposes.

Perhaps all too few of us, in the course of everyday business, realize how important the status of the nation's forests is to this industry. For nearly forty years, certain public agencies have been dwelling upon the impending timber famine, the industrial rape of the forests, and the necessity for federal regulations of privately owned forest lands. Actual practice and association research have definitely disproven any prospect of a timber famine and actually the forest lands of the paper and pulp industry are in an eminently satisfactory condition. Realizing the importance, however, of a continued and assured supply of wood, the Association has as consistently urged good forest practices upon the industry as it has fought government regulation of its forest lands.

I will not attempt to cover the entire field of the association's work. To do so would take many hours. I do, however, wish to run through some of the problems created for the industry by the defense program and how the association has met them.

National Defense Program

Early in the National Defense Program it became apparent that the regular operations of the paper and pulp industry would be severely affected by an unprecedented demand for paper and pulp, by shortages of materials needed by the industry and also critical to the Defenst Program, and by other factors. An industry defense committee was appointed with Ralph Hayward as chairman, to study the many problems and to cooperate with the Government in every way possible. Because of many rumors and statements which were rampant early this year to the effect that a pulp and paper shortage was immediately imminent, the first major job undertaken by the committee was a study of paper and pulp productive capacity as compared with demand as estimated by the Office of Production Management. The report was compiled at the expense of a considerable amount of time of the committee and was accepted by the OPM. Its findings obviated at the time any government interference with the industry and also did much to alleviate the panic buying situation which was developing. Time has proven the findings of the report to be absolutely sound, and a second report covering the situation for 1942 will be undertaken in the near future and transmitted to OPM.

The committee's dealings with OPACS have likewise been satisfactory and permitted orderly adjustments to be made in the industry. The industry entered 1940 with a depressed price structure and a record conspicuous by its low profits or absence of profits. Reports covering cost-price relationships in the major grades of paper were submitted to OPACS which permitted price adjustments to cover rising cost schedules. There has been no threat of price ceiling establishment in the paper and pulp industry.

Priorities on Critical Materials

In the matter of priorities on critical materials, the association has maintained an office and small staff in Washington for some months past to facilitate the applications for priority ratings on materials needed by paper and pulp companies. This office, judging by the results, has been a huge success; over one hundred companies having received satisfactory service.

At the present time the association and its technical committee are engaged in work with which many of you are familiar. I am referring to the solution to problems created by the requisitioning of chlorine for defense use. The industry is now facing a minimum curtailment of at least forty per cent of its normal consumption of chlorine. Accepted as a hit or miss proposition, the entire grade and competitive structure of the industry would fall into a state of chaos. For several weeks past the technical committee has been analyzing and correlating data of chlorine increment and pulp brightness in order that OPM may direct chlorine curtailment for defense use in an intelligent manner. This entire project is being conducted in collaboration with OPM. Apparently a much greater chlorine curtailment is in prospect for 1942 and the last chapter in the industry's position has not yet been written.

I believe I have gone far enough in this talk to afford you a comprehensive view of the work and functions of the American Paper and Pulp Association. The association has a proud record and I am deeply grateful that I have had the privilege of taking some part in the making of it.

Attendance At the TAPPI Convention

A

R. G. Abbey, General Refractories Co.
Mr. and Mrs. Peter J. Abel, Stickle Steam Spec. Co.
Allen Abrams, Marathon Paper Mills Co.
Mrs. Allmaker, Appleton, Wis.
R. J. Amberg, Johns-Manville Co.
S. I. Andersen, Hooker Electrochemical Co.
Dr. R. S. Apple, R. T. Vanderbilt Co.
J. W. Appling, The Institute of Paper Chemistry
S. I. Aranovsky, Northern Regional Research Lab.
W. H. Artz, Westinghouse Electric & Mfg. Co.
Richard Aument, American Box Board Co.
Walter Ayles, American Cyanide & Chemical Co.

B

Mr. and Mrs. C. L. Bachelder, Hercules Powder Co.
Mr. and Mrs. Milton R. Bailey, Bulkley-Dunton Pulp Co., Inc.
Parker K. Baird, U. S. Forest Products Lab.
C. M. Baker, Madison, Wis.
Mr. and Mrs. R. R. Baker, Westinghouse Elec. & Mfg. Co.
W. E. Byron Baker, N. Y. and Pennsylvania Co., Inc.
Paul C. Baldwin, Scott Paper Co.
A. N. Ball, The E. B. Eddy Co., Ltd.
D. K. Ballman, Dow Chemical Co.
John W. Bard, Kausau, Wis.
P. S. Barnhart, Westfield River Paper Co., Inc.
P. W. Bartholomew, Hercules Powder Co.
Mr. and Mrs. Ray L. Barton, Michigan Paper Co.
John Bauman, Kalamazoo Vegetable Parchment Co.
Mr. and Mrs. F. K. Becker, American Coating Mills, Inc.
Henry K. Benson, University of Washington
Russel H. Bentz, P. H. Glatfelter Co.
F. W. Bentzen, Kimberly Clark Corp.
Mr. and Mrs. Harry G. Bickley, West Virginia Pulp & Paper Co.
Dr. M. H. Bigelow, Plaskon Co.
R. P. Bigger, American Can Co.
O. T. Birkeness, Wallace & Tiernan Co., Inc.
A. L. M. Bixler, Milford, N. J.
Mr. and Mrs. Howard J. Blake, Morley Mfg. Co.
F. H. Bopp, American Can Co.
Peter B. Borlew, Wisconsin Rapids, Wis.
Francis O. Boylan, Scott Paper Co.
Rex Bradt, Consulting Chemist, Battle Creek
L. C. Bratt, U. S. Forest Products Laboratory
G. S. Brazeau, Weyerhaeuser Timber Co.
Mr. and Mrs. S. E. Brennan, Mathieson Alkali Works
Frederic E. Brinnick, Lowe Paper Co.
Bruce F. Brown, Jr., Fiberboard Products, Inc.
Dr. B. L. Browning, Inst. of Paper Chemistry
J. G. Bucuss, Acme Steel Co.
J. L. Buell, Reliance Electric and Engineering Co.
Karl E. Buff, National Auto Fibres
John O. Burton, Minnesota & Ontario Paper Co.

C

P. S. Cade, Stein, Hall Mfg. Co.
O. W. Callighan, Edgar Brothers Co.
Homer N. Calver, Cup and Container Institute
Floyd R. Campbell, West Virginia Pulp & Paper Co.
R. A. Campbell, Blandin Paper Co.
B. R. Cancell, American Paper & Pulp Association
Preston I. Carnes, Schell & Smith
Glenn V. Cathey, B. F. Goodrich Co.
R. G. Carson, Solvay Sales Corp.
F. Casciani, Niagara Alkali Company
Wilbur L. Cassiday, Port Huron, Mich.
Allen L. Chaplin, Leeds and Northrup Co.
Mr. and Mrs. Fred Chappell, Jr., Sutherland Paper Co.
K. G. Chesley, Crossett Research Laboratory
G. H. Chidester, Forest Products Laboratory
Carleton L. Clark, Winchester, Ind.
James B. Clarke, National Aniline & Chemical Co.
Arthur A. Coffin, Titanium Pigment Corp.
Mr. and Mrs. A. E. Conklin, C. A. Reed Co.
C. M. Connor, New York City
C. W. Converse, Port Edwards, Wis.
John Cornell, *Paper Mill News*
S. V. Cottrell, Nat'l Aniline & Chemical Co., Inc.
Mr. J. Cotton, Corn Products Sales Co.
Mr. and Mrs. W. L. Craig, R. T. Vanderbilt Co., Inc.
Dean and Mrs. Ivan C. Crawford, University of Michigan
H. C. Crosland, National Starch Products, Inc.
Mr. and Mrs. A. H. Croup, Hammermill Paper Co.

D

Mr. and Mrs. Thage Dahlgren, Gardner Richardson Co.
Dean and Mrs. S. T. Dana, University of Michigan
Roy L. Davis, Detroit Sulphite P. and P. Co.
W. E. Davis, Solvay Process Co.
Mr. and Mrs. Paul deGuehery, Michigan Paper Co.
F. H. Denham, R. T. Vanderbilt Co., Inc.
V. S. Denison, Beloit Iron Works
F. L. Dennett, Dow Chemical Co.
G. F. DesAuteles, Kalamazoo Vegetable Parchment Co.
Mr. and Mrs. David DeZurik, DeZurik Shower Co.
Mr. and Mrs. T. E. Dial, Socony Vacuum Oil Co.
Mr. and Mrs. J. D. Dickson, Jr., R. T. Vanderbilt Co., Inc.
R. A. Diehm, Rohm & Haas Co.
Mr. and Mrs. W. P. Dohne, Wyandotte, Mich.
Mr. and Mrs. M. L. Downs, Thilmany Pulp & Paper Co.
Mr. and Mrs. Pierre Drewson, Hinde & Dauch Paper Co.
Miss Karen Drewsen
W. W. Duecker, Texas Gulf Sulphur Co.
Mr. and Mrs. J. R. Dufford, Patterson Parchment Paper Co.
T. L. Dunbar, Chemipulp Process, Inc.
George C. Dunn, Dunn Sulphite Paper Co.
C. L. Durkee, D. J. Murray Mfg. Co.
H. E. Duston, Monsanto Chemical Co.

E

Homer Eaton, Michigan Alkali Co.
I. V. Earle, Deerfield Glassine Co.
Jacob Edge, Downington Mfg. Co.
Miss Elizabeth Edge, Downtington, Pa.
Linton Edgerly, Sartell, Minn.
Mr. and Mrs. Roger Egan, Bulkley, Dunton Pulp Co.
Mr. and Mrs. Frank B. Eilers, Kalamazoo, Mich.
Ivar Elkholm, Nat'l Aniline and Chemical Co., Inc.
R. T. Elias, Detroit Sulphite Pulp & Paper Co.
Mr. and Mrs. Harry D. Eliason, Kalamazoo, Mich.
Mr. and Mrs. F. D. Elliott, E. J. Kelly Co.
A. C. Embshoff, International Filter Co.
Robert L. Eminger, Superintendents Association.
Edward Engel, Englewood, N. J.
Mr. and Mrs. J. A. Extrom, Tomahawk Kraft Paper Co.

F

Tom Falknor, Edgar Brothers Co.
James Fallon, Indianapolis, Ind.
H. S. Faram, Watervliet Paper Co.
H. C. Fernau, Tyrone, Pa.
Ralph Figgs, Scott Paper Co.
Mr. and Mrs. M. F. Fillius, Eastman Kodak Co.
Mr. and Mrs. Charles A. Fisher, University of Michigan
L. E. Fitzgerald, Hercules Powder Co.
John D. Fleming, Monsanto Chemical Co.
Claude Fletcher, Bryant Paper Co.
Mr. and Mrs. Harry Fletcher, Fletcher Paper Co.
Myron Flotow, French Paper Co.
John A. Flynn, Hooker Electrochemical
M. J. Foley, Westinghouse Electric & Mfg. Co.
James Foote, Berst-Foster-Dixfield
William J. Foote, Consolidated Water Power & Paper Co.
J. A. Foxgrover, Hercules Powder Co.
C. A. Frankenhoff, The Dicalite Co.
H. W. Frazer, International Filter Co.
R. D. Freeman, Dow Chemical Co.
Val Friedrich, The Beckett Paper Co.
K. W. Fries, Rhinelander Paper Co.
Mr. James Fritz, National Oil Products Co.
Mr. and Mrs. Harry D. Frost, The Sinclair Co.
Miss Dorothy Frost, Holyoke, Mass.

G

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J. N. Gammon, National Oil Products Co.
William A. Geiger, Weyerhaeuser Timber Co.
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G. R. Gerpheide, Hawthorne Paper Co.
John W. Gilkey, Kalamazon, Mich.
Edward P. Gillan, St. Louis, Mo.
Mr. and Mrs. W. F. Gillespie, Gaylord Container Corp.
Miss Gillespie, Bogalusa, La.
P. H. Glatfelter, III, P. H. Glatfelter Co.
Philip H. Goldsmith, Wilmington, Del.
Percival Gooding, Strathmore Paper Co.
John H. Graff, Institute of Paper Chemistry
N. S. Grant, Great Lakes Paper Co., Ltd.
G. K. Greminger, Dow Chemical Co.
L. L. Griffiths, Jr., Williams-Gay Co.

H

H. W. Hall, Jr., The Dicalite Co.
Mr. and Mrs. John F. Halladay
Frank B. Hamilton, Allied Paper Mills
Mr. and Mrs. H. Hammerlund, Hamersley Mfg. Co.
Miss Lois V. Hans, Pettengill, Inc.
Mr. and Mrs. John A. Hanson, Badger Paper Mills
Mr. and Mrs. Paul W. Hardesty, Mead Corp.
Mr. and Mrs. Mace Harris, Northwest Paper Co.
H. H. Harrison, Crystal Tissue Co.
H. A. Harvey, Penick & Ford, Ltd.
R. S. Hatch, Weyerhaeuser Timber Co.
W. F. Hathaway, Kalamazoo Vegetable Parchment Co.
Mr. and Mrs. R. S. Hawley, University of Michigan.
J. L. Hayes, Bemis Brothers Bag Co.
Mr. and Mrs. Ralph Hayward, Kalamazoo Vegetable Parchment Co.
Jack Hayward, Kalamazoo, Mich.
Mr. and Mrs. Lewis Hebbs, Edgeworth House, Arlesey, England
O. W. Hein, Shartle Bros. Machine Co.
M. Heinig, Forest Products Laboratory
J. W. Hemphill, Johns-Manville Co.
Al Hendricks, Central Paper Co.
George Hendrick, Michigan Alkali Co.
Ed Henton, Kalamazoo Vegetable Parchment Co.
Earl M. Hill, Consolidated Water Power & Paper Co.
C. W. Hoffman, Riegel Paper Co.
Edward R. Hoffman, Hammermill Paper Co.
Mr. and Mrs. J. A. Holmes, National Aluminate Corp.
A. A. Hormel, J. E. Rhoads & Sons
H. J. Hotz, Central Paper Co., Inc.
Dr. Harold H. Houtz, Crown Zellerbach Corp.
Mr. and Mrs. Charles M. Howell, Scott Paper Co.
Lynn D. Howell, Marathon Paper Mills
C. E. Hrubesky, Forest Products Laboratory
A. E. Hughes, Michigan Alkali Co.
R. F. Huntley, Sealright Co., Inc.
Mr. and Mrs. R. H. Hurst, Kalamazoo Vegetable Parchment Co.
W. S. Huss, Acme Steel Company

I

Harold Ingalls, P. H. Glatfelter Co.
Stuart Irvine, Saniwax Paper Co.

J

Mr. and Mrs. E. C. Jacobi, E. C. Jacobi Co.
Hannes Jansson, Pulp Sales Corp.
Roy B. Johns, Freeport Sulphur Co.
H. D. Johnston, Strathmore Paper Co.
R. G. Johnstone, The E. B. Eddy Co., Ltd.

K

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Mr. and Mrs. R. D. Kehoe, Paper and Industrial Appliance
Mr. and Mrs. M. I. Keirn, Wallace & Tiernan Co., Inc.
William A. Kelley, Milwaukee, Wis.
N. W. Kent, E. I. DuPont De Nemours & Co., Inc.
W. O. Kenyon, Eastman Kodak Co.
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Miss Helen U. Kiely, American Writing Paper Corp.
J. E. Killinger, Penick & Ford, Ltd.
Mr. and Mrs. D. B. Kimball, Eastman Kodak Co.
Mr. and Mrs. Kenneth J. Kimball, Improved Paper Machinery Corp.
Myron Kin, Dow Chemical Co.
Mr. and Mrs. J. Kindleberger, Kalamazoo Vegetable Parchment Co.
Mr. and Mrs. C. E. Kinney, Hercules Powder Co.
Mr. and Mrs. W. A. Kirkpatrick, Allied Paper Mills
R. P. Kite, The Don Company
Edwin F. Klueh, Beveridge Paper Co.
Mr. and Mrs. M. F. Knack, River Raisin Paper Co.

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Mr. and Mrs. R. L. Kreyling, Philadelphia Quartz Co.
Mr. and Mrs. Stephen Kukoluch, Gilbert Paper Co.
Gunnar Kulvik, Pulp Sales Corp.

L

Mr. and Mrs. T. E. Lagerstrom, International Nickel Co.
O. F. Lane, Krebs Pigment & Color Corp.
C. A. Lankton, Dow Chemical Co.
F. L. LaQue, International Nickel Co., Inc.
Mr. C. Larson, Corn Products Sales Co.
Mr. and Mrs. Leslie L. Larson, Kimberly-Clark Corp.
H. T. Latham, E. I. DuPont De Nemours Co., Inc.
Mr. T. H. Latimer, Black Clawson Co.
Edwin R. Laughlin, E. I. DuPont De Nemours Co., Inc.
Eric T. Laurin, Calgon, Inc.
Arthur W. Legge, International Printing Ink Co.
James A. Lee, Chemical and Met. Engineering
Harold J. Lausman, Consolidated Water Power & Paper Co.
Ralph M. Leighton, Stowe-Woodward, Inc.
Harry F. Lewis, Institute of Paper Chemistry
C. E. Libby, N. Y. State College of Forestry
Mr. and Mrs. Frank Libby, Kalamazoo Vegetable Parchment Co.
Charles Lightfoot, The Todd Co.
J. Limerick, Bathhurst Power & Paper Co., Ltd.
P. M. Leddengaard, Bulkley, Dunton Pulp Co., Inc.
J. O. Logan, Mathieson Alkali Works
J. E. Loughead, Joe E. Loughead Co.
Mrs. A. H. Lovell, Ann Arbor, Mich.
A. Luettgon, P. H. Glatfelter Co.
A. T. Luey, American Coating Mills
A. R. Lukens, Thompson, Weinman & Co., Inc.
Edward Lum, The Beckett Paper Co.

Mc

J. M. McAlear, Mason Neilan Regulator Co.
George A. McBride, International Filter Co.
J. W. McClaran, National Starch Products, Inc.
M. F. McCombs, Niagara Alkali Co.
Professor and Mrs. McCready, University of Michigan
J. N. McGovern, Forest Products Laboratory
Miss Louise E. McGrath, Booth Chemical Co.
Mr. and Mrs. Ralph H. McKee, New York City
R. B. McKinney, Hercules Powder Co.
Carl McLaughlin, Carnegie Illinois Steel Corp.
Archibald M. McLintock, Texas Gulf Sulphur Co.
J. Louis McMahon, Erie, Pa.
W. M. McNair, Weyerhaeuser Timber Co.
L. J. McNamara, Pulp and Paper Mfgrs. Association

M

G. E. Machin, Forest Products Laboratory
William W. Macklam, The Black-Clawson Co.
Mr. and Mrs. N. L. Malcove, Northern Paper Mills
Mr. and Mrs. Russell T. Mann, Foster Paper Co.
Winnifred Mann, Utica, N. Y.
G. M. Markle, E. I. DuPont De Nemours Co., Inc.
W. O. Manor, Consolidated Paper Co.
C. V. Mars, Ansul Chemical Co.
Hoke Martin, Hercules Powder Co.
Mr. and Mrs. R. B. Martin, Wallace & Tiernan Co., Inc.
Gib Mason, Edgar Brothers Co.
W. R. Maull, The Mead Corp.
R. G. Macdonald, Secretary-Treasurer, TAPPI
Miss Besse Merrithew, *The Paper Industry & Paper World.*
W. K. Metcalfe, J. O. Ross Engineering Corp.
F. F. Minnear, United Wall Paper Factories, Inc.
W. H. Monsson, Hooker Electrochemical Co.
D. G. Moon, J. E. Sirrine Co.
A. B. Moore, Jr., Crossett Research Laboratory
Mr. and Mrs. Walter B. Morehouse, National Oil Products Co.
Owen D. Mosher, The Tanglefoot Co.
Mr. and Mrs. L. A. Moss, Stevens Point, Wis.
D. C. Murchison, Georgia Kaolin Co.
Harold R. Murdock, Champion Paper & Fibre Co.

N

H. E. Nason, Westinghouse Electric & Mfg. Co.
Harley E. Nelson, Nekoosa Edwards Paper Co.
Milo Nelson, Kalamazoo Vegetable Parchment Co.
H. H. Newman, Swenson Evaporator Co.
G. W. E. Nicholson, Union Bag and Paper Co.
Walter A. Nivling, Huron Milling Co.
Mr. and Mrs. R. E. Noreus, Northwest Paper Co.
John J. Nylund, General Dyestuff Corp.

O

Max R. Oberdorfer, St. Helens Pulp & Paper Co.
R. A. Olson, Diamond Alkali Co.
C. J. O'Neil, Johns-Manville Co.

P

John L. Parsons, Hammermill Paper Co.
T. A. Pascoe, Nekoosa Edwards Paper Co.
J. C. Pew, Forest Products Laboratory
E. Peterson, B. F. Goodrich Co.
M. W. Phelps, The Solvay Process Co.
Mr. and Mrs. W. E. Phillips, Mathieson Alkali Works, Inc.
Ward Pitkin, Oliver United Filters Co.
Charles J. Prescott, Jr., American Cyanamid Chemical Co.
Mr. and Mrs. T. Richard Probst, Gilbert Paper Co.

R

Mr. and Mrs. E. W. Rasmussen, International Paper Co.
Edward Ratstatter, Hammermill Paper Co.
Francis G. Rawling, West Virginia Pulp & Paper Co.
E. O. Reed, Crane & Co.
Lewis S. Reid, Metropolitan Life Insurance Co.
Dr. J. S. Reichert, E. I. DuPont De Nemours Co., Inc.
C. W. Richards, Oxford Miami Paper Co.
E. D. Rich, Niagara Falls, N. Y.
William R. Rinelli, Ansul Chemical Co.
George J. Ritter, Forest Products Laboratory
Mr. and Mrs. C. W. Rivise, Caesar & Rivise, Attorneys
Mr. and Mrs. Martin J. Roberts, Dow Chemical Co.
Mr. and Mrs. Neil F. Robertson, Chester, Pa.
Mr. and Mrs. C. P. Robinson, Heppenstall Company
J. D. Robinson, Resinous Products & Chemical Co.
H. F. Roderick, Michigan Alkali Co.
A. C. Rogers, Fraser Companies, Ltd.
Mr. and Mrs. Edward M. Root, Dilts Machine Works
W. Earl Rowe, Great Lakes Pulp & Paper Co., Ltd.
J. P. Robush, Swenson Evaporator Co.
J. D. Rue, Hooker Electrochemical Co.
Mr. and Mrs. H. T. Ruff, The Mead Corp.
Lawrence E. Russell, Mathieson Alkali Works
W. M. Russell, Monsanto Chemical Co.
Marshall Rutz, Kalamazoo Vegetable Parchment Co.
Dr. and Mrs. Alexander G. Ruthven, University of Michigan

S

V. I. Safro, Michigan Alkali Co.
E. R. Schafer, Forest Products Laboratory
Hugo Schapiro, The Ohio Boxboard Co.
C. J. Schmidt, J. O. Ross Engineering Corp.
Mr. and Mrs. C. C. Schneider, Hawthorne Paper Co.
Mr. and Mrs. F. W. Schneider, American Writing Paper Corp.
P. W. Schnorbach, Filer Fibre Co.
Fred Schorkon, Filer Fibre Co.
Paul R. Schreiber, General Dyestuff Corp.
John Schuber, The Solvay Process Co.
Dr. George R. Sears, Institute of Paper Chemistry
G. E. Seavoy, Swenson Evaporator Co.
C. O. Seborg, U. S. Dept. of Agriculture, Forest Products
Mr. and Mrs. Fred Shankweiler, Hercules Powder Co.
C. B. Shepherd, E. I. DuPont De Nemours & Co., Inc.
F. A. Simmonds, Forest Products Laboratory
Mr. and Mrs. R. H. Simmons, Washington, D. C.
Mr. and Mrs. James R. Simpson, Champion Paper & Fibre Co.
Harold Sinclair, American Cyanamid & Chemical Corp.
L. E. Skinner, Port Huron Sulphite & Paper Co.
C. B. Smith, Huron Milling Co.
Clarence L. Smith, National Container Corp.
Hugh C. Smith, Kalamazoo Vegetable Parchment Co.
L. K. Smith, Pacific Pulp and Paper Industry
J. F. Smith, Dow Chemical Co.
Olga A. Smith, Institute of Paper Chemistry
Roscoe H. Smith, Reliance Electric & Engineering Co.
Mr. and Mrs. A. Southon, Kalamazoo Vegetable Parchment Co.
H. C. Speel, Atlas Powder Co.
George K. Spence, Castanea Paper Co.
H. A. Spencer, Knowlton Brothers
I. J. Stafford, Neenah Paper Co.
B. F. Stahl, Terre Haute Paper Co.
B. K. Steadman, Standard Paper Mfg. Co.
J. R. Stenstrom, Hammermill Paper Co.
M. E. Stern, National Starch Products, Inc.
Sam Stevens, Berst Forster-Dixfield
E. K. Stilbert, Dow Chemical Co.
H. J. Stilp, Corn Products Sales Co.
T. L. Stirling, Hercules Powder Co.
John G. Strange, Institute of Paper Chemistry
J. P. Strasser, Stein, Hall Mfg. Co.
R. R. Stoltz, Westinghouse Electric & Mfg. Co.
P. B. Stull, Hercules Powder Co.
Mr. and Mrs. L. T. Summers, Port Huron Sulphite Co.
H. Sutton, Hammermill Paper Co.
Mr. and Mrs. W. H. Swanson, Kimberly-Clark Corp.
C. R. Swett, Stein, Hall Manufacturing Co.

T

Philip Taft, Resinous Products & Chemical Co.
Mr. and Mrs. Charles R. Tait, Hammermill Paper Co.
P. A. Talbot, R. T. Vanderbilt Co.
Edmund B. Taylor, American Cyanamid Co.
Mr. and Mrs. W. S. Taylor, American Cyanide & Chemical Corp.
K. R. Tefft, Michigan Alkali Co.
C. K. Textor, Bauer Brothers Co.
Arthur Thero, Detroit Sulphite P. & P. Co.
Mr. and Mrs. B. M. Thomas, American Coating Mills, Inc.
Edgar E. Thomas, Appleton Machine Co.
Joseph J. Thomas, Rohm & Haas Co.
Ralph D. Thomas, Ralph D. Thomas Co.
Mrs. Lars Thomassen, Ann Arbor, Mich.
Earl G. Thompson, Dow Chemical Co.
Dwight J. Thomson, Champion Paper & Fibre Co.
George A. Thompson, Jr., B. F. Perkins & Son, Inc.
Karl M. Thorsen, Chesapeake Co.
Mr. and Mrs. P. H. Tigwell, Paper Machinery
Miss Dorothy Tigwell, Beloit, Wis.
Mr. and Mrs. John C. Tongren, Hammermill Paper Co.
W. R. Tobin, American Box Board Co.
Thomas W. Toovey, Pennsylvania Salt Mfg. Co.
Mr. and Mrs. Paul Torre, DeZurik Shower Co.
G. F. Touse, Peninsular Paper Co.
John Traquair, The Mead Corp.
M. B. Turner, Dow Chemical Co.
R. Tutt, Jr., Peter Cooper Corp.

U

Mr. and Mrs. R. W. Kenneth Ulm, Ohio Boxboard Co.
D. D. Uong, Fitchburg Paper Co.
R. M. Upright, Dow Chemical Co.

V

E. J. Vandenberg, Hercules Experiment Station
H. L. Vandenberg, A. E. Staley Mfg. Co.
C. R. Vander Meulen, Penick & Ford, Ltd.
R. W. Van Kirk, Jr., Penick & Ford, Ltd.
D. B. Van Tassell, Bigelow-Liptak Co.
James R. Verdon, American Cyanamid & Chemical Corp.
Carlo Vicario, Nash Engineering Co.
Rex Vincent, Bulkley, Dunton Pulp Co.
Reine Vogt, Consolidated Water Power & Paper Co.
Carl A. von Ende, S. D. Warren Co.

W

Mr. and Mrs. Kurt Wandel, The Lukenweld Steel Dryer Co.
Harold C. Webber, Morris Paper Mills Co.
William J. Weed, Niagara Alkali Co.
John P. Weidner, Hoberg Paper Mills Co.
W. M. Welton, West Virginia Pulp & Paper Co.
Paul H. West, Thilmany Pulp & Paper Co.
Harry E. Weston, Fritz Publication, Inc.
Mr. and Mrs. A. E. White, Ann Arbor, Mich.
Mr. and Mrs. A. H. White, Ann Arbor, Mich.
Mr. and Mrs. William White, Kalamazoo Vegetable Parchment Co.
Mr. and Mrs. J. E. Whitfield, Brown Paper Mill Co., Inc.
Merle R. Wilkins, Bryant Paper Co.
R. A. Wilkins, Bird & Son Machine Plant
D. H. Williams, Port Huron Sulphite Co.
Myron C. Wittmer, Cheney Pulp & Paper Co.
John C. Wollwage, Kimberly-Clark Corp.
Edward P. Wood, Weyerhaeuser Timber Co.
Mr. and Mrs. John Wood, Kalamazoo Vegetable Parchment Co.
R. T. Woodforo, Arkell & Smiths
M. D. Woodruff, Bauer Brothers Co.
J. G. Wright, A. M. Meincke & Sons, Inc.

Y

Robert M. Young, Scott Paper Co.

Z

H. C. Zeni, American Cyanamid & Chemical Corp.
William R. Zwecker, North American Pulp & Paper Corp.

Since 1866 our policy of Fair Service to All has been the bulwark of our business. It has withstood the test of two major wars and several depressions. Today our customers have confidence in our ability to protect their interests . . especially through the present emergency. They have confidence in our high quality special starches and gums for specific paper needs . . products which reflect the craftsman's art in skillfully converting the best materials the world affords. This customer confidence is one of our most valuable assets. We shall do all in our power to preserve and strengthen it.

STEIN, HALL & COMPANY, INC.
285 MADISON AVENUE NEW YORK

STEIN-HALL MFG. COMPANY
2841 S. ASHLAND AVENUE CHICAGO

Founders: STEIN-HALL RESEARCH FELLOWSHIP AT THE INSTITUTE OF PAPER CHEMISTRY, APPLETON, WIS.

OPA Announces Waste Paper Price Schedule

Office of Price Administration Issues Part 1347 On Paper and Paper Products Including Price Schedule No. 30 Covering Waste Paper East of Rocky Mountains—Order To Become Effective October 1.

The Office of Price Administration issued on September 18 the following order covering the new prices of waste paper:

This schedule is at present limited to sales and purchases of waste paper East of the Rocky Mountains, since no inflationary price increases threaten the West Coast area.

Accordingly, under the authority vested in me by Executive Order No. 8734, it is hereby directed that:

1347.1, MAXIMUM PRICES FOR WASTE PAPER. On and after October 1, 1941, regardless of the terms of any contract of sale or purchase or other commitment, in the area East of the Rocky Mountains no person shall sell, offer to sell, deliver or transfer any grade of waste paper, and no person shall buy, offer to buy, or accept delivery of any grade of waste paper at prices higher than the maximum prices set forth in Appendix A hereof, incorporated herein as Section 1347.10.*

* Sections 1347.1 to 1347.10, inclusive, issued pursuant to the authority contained in Executive Order No. 8734.

1347.2 LESS THAN MAXIMUM PRICES—Lower prices than those set forth in Appendix A may, however, be charged, demanded, paid or offered.*

1347.3 EVASION—The price limitations set forth in this Schedule shall not be evaded by direct or indirect methods in connection with a purchase, sale, delivery, or transfer of waste paper, alone or in conjunction with any other material, or by way of any commission, service, transportation or other charge, or discount, premium or other privilege, or by tying-agreement or other trade understanding, or otherwise.*

1347.4 RECORDS—Every person making purchases or sales aggregating ten short tons or more of any or all grades of waste paper in any one month shall keep for inspection by the Office of Price Administration for a period of not less than one year, complete and accurate records of each purchase or sale of waste paper made during such month and each month thereafter, showing the date thereof, the name of the buyer or of the seller, the prices paid or received, and the quantity and grade or grades so purchased or sold. Such records shall set forth separately the f.o.b point of shipment price and the transportation charge.*

1347.5 AFFIRMATION OF COMPLIANCE—All persons who are required by Section 1347.4 to keep records, shall transmit, on or before November 10, 1941, and on or before the tenth day of each month thereafter, an affirmation of compliance on Form 130:1 containing a sworn statement that during the month for which the record is kept all purchases and sales were made at prices in compliance with this Schedule or with any exception or modification thereof. Copies of Form 130:1 can be procured from the Office of Price Administration or, provided no change is made in the style and content of it and that it is reproduced on 8" x 10½" paper, may be prepared by persons required to submit affirmation of compliance hereunder.*

1347.6 ENFORCEMENT—In the event of refusal or failure to abide by the price limitations, record requirements, or other provisions contained in this Schedule, the Office of Price Administration will make every effort to assure (a) that the Congress and the public are fully informed thereof, (b) that the powers of Government, both state and federal, are fully exerted in order to protect the public interest and the interests of those persons who comply with this Schedule, (c) that full advantage will be taken of the cooperation of the various political subdivisions of state, county, and local governments through calling to the attention of the proper authorities failures to comply with this Schedule which may be regarded as grounds for the revocation of licenses and permits; and (d) that the procurement services of the Government are requested to refrain from selling to or purchasing from those persons who fail to comply with this Schedule. Persons who have evidence of the offer, receipt, demand or payment of prices higher than the maximum prices, or of any evasion or effort to evade the provisions hereof, or of speculation or manipulation of prices of any or all of the grades of waste paper or of the hoarding or accumulation of unnecessary inventories thereof, are urged and requested to communicate with the Office of Price Administration.*

1347.7 MODIFICATION OF THE PRICE SCHEDULE—Persons complaining of hardship or inequity in the operation of this Schedule may apply to the Office of Price Administration for approval of any modification thereof or exception therefrom.*

1347.8 DEFINITIONS—When used in this Schedule, or any modifications or exceptions thereto, the term

(a) "Person" includes an individual, partnership, association, corporation, or other business entity.

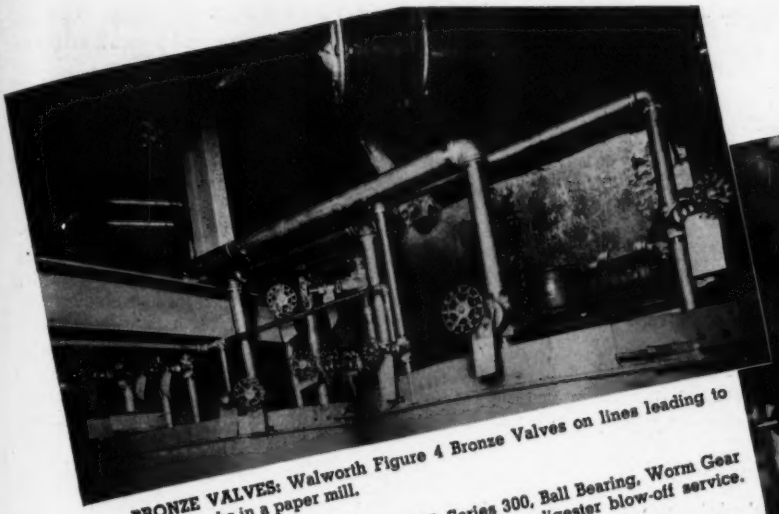
(b) "Wastepaper" includes all kinds, and grades and types of waste paper.

(c) "Consumer" means a purchaser, for its own

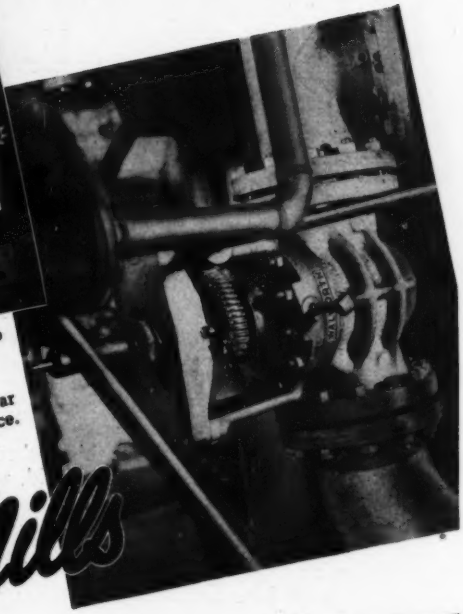
Maximum Prices for Waste Paper

All prices given below are per short ton, f.o.b. point of shipment [1]

Grades	Maximum Prices [2]
No. 1 Mixed Paper [3]	$13.00
Super-Mixed Paper [4]	14.00
No. 1 Baled News [5]	15.00
Overissue News [6]	17.00
Old Corrugated Containers [7]	16.50
Old Kraft Corrugated Containers [8]	27.00
New Corrugated Cuttings [9]	18.00
Box Board Cuttings [10]	14.50
White Blank News [11]	33.00
Extra Manilas [12]	37.00
New Manila Envelope Cuttings [13]	54.00
No. 1 Hard White Shavings [14]	50.00
Hard White Envelope Cuttings [15]	60.00
No. 1 Soft White Shavings [16]	43.00
Fly Leave Shavings [17]	33.50
No. 1 Heavy Books and Magazines [18]	31.50
Mixed Books [19]	20.50
Overissue Magazines [20]	33.50
No. 1 Mixed Ledger (Colored Ledger) [21]	38.50
No. 1 White Ledger [22]	42.50
No. 1 Assorted Kraft (Old Kraft) [23]	30.00
No. 100% Kraft Cuttings [24]	52.00
New 100% Kraft Corrugated Cuttings [25]	49.00

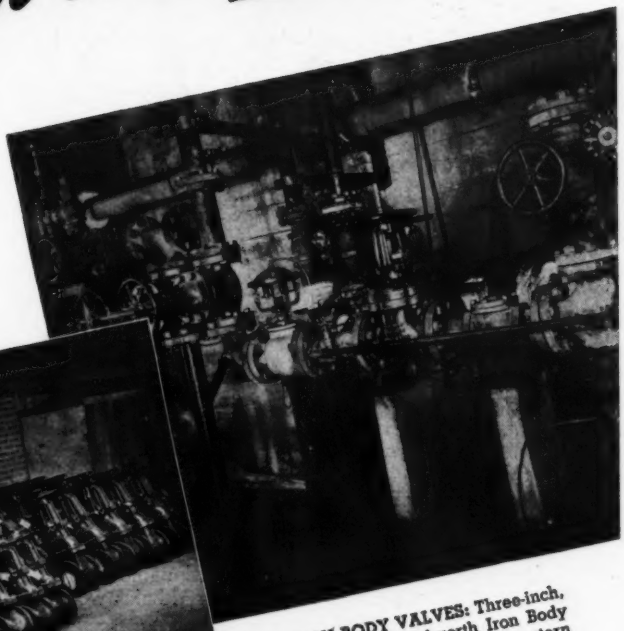


BRONZE VALVES: Walworth Figure 4 Bronze Valves on lines leading to mixing tanks in a paper mill.

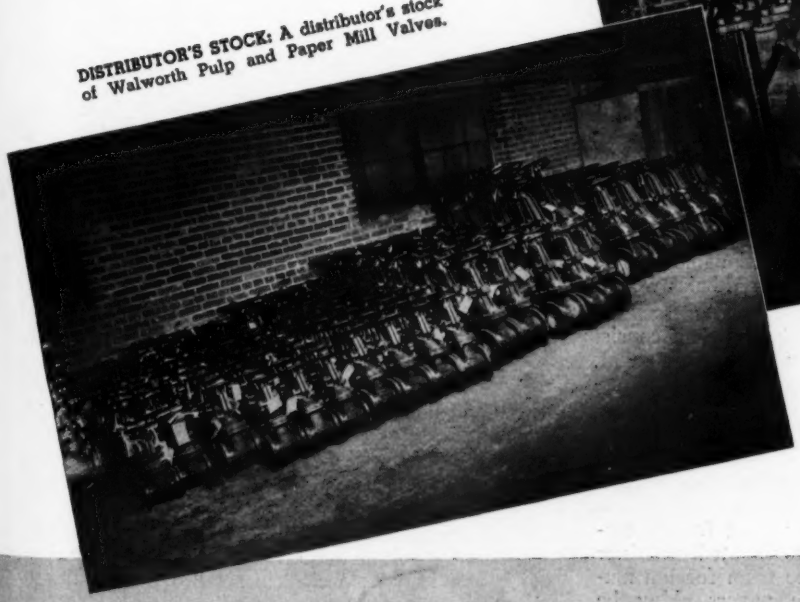


LUBRICATED PLUG VALVES: An 8", Series 300, Ball Bearing, Worm Gear Operated, Walworth Lubricated Plug Valve on digester blow-off service.

Pulp and Paper Mills



IRON BODY VALVES: Three-inch, extra heavy Walworth Iron Body Gate Valves in a northeastern paper mill.



DISTRIBUTOR'S STOCK: A distributor's stock of Walworth Pulp and Paper Mill Valves.

consumption, of wastepaper, i.e. paper mill, paperboard mill, roofing mill, etc.

(d) "Producer" means any person who produces, collects, sorts, packs, offers for sale, sells, or exchanges any wastepaper.*

1347.9 EFFECTIVE DATE—This Schedule shall become effective on October 1, 1941.*

1347.10 APPENDIX A

[1] All prices established by this Schedule shall be for waste paper loaded on freight cars, trucks or other means of conveyance at the point of shipment. The point of shipment is the point from which the waste paper is to be shipped to the consumer.

Grades of Waste Paper Defined

[2] All prices listed represent the maximum prices for the respective grades of waste paper, the highest qualities of which are defined in the footnotes below. Other qualities of waste paper of the grades defined must be sold at or below the maximum prices established.

The prices established in this Schedule are the maximum prices to be charged or paid, and no differentials or service charges are to be added. In the event that hardship will be inflicted on any person by virtue of the removal of differentials that were in effect prior to January 1, 1941, application for exception should be made in accordance with Section 1347.7 hereof.

[3] "No. 1 Mixed Paper" shall consist of clean dry waste paper, free from objectionable papers and foreign materials; and packed in large machine compressed bales weighing 650 pounds or more.

[4] "Super-Mixed Paper" shall consist of No. 1 mixed paper which has been screened and dusted, and is composed of hard, bright stock. The process of screening and dusting shall be performed mechanically by a "tumbler" or similar device. Must be packed in large machine compressed bales weighing 650 pounds or more.

[5] "No. 1 Baled News" shall consist of clean, dry, sorted and repacked newspapers free from foreign materials, objectionable and mixed papers and packed in large machine compressed bales weighing 650 pounds or more.

[6] "Overissue News" shall consist of all-white, large size, over-run newspapers from a newspaper office (not over 60 days old) and may be packed in securely tied bundles, small or large bales.

[7] "Old Corrugated Containers" shall consist of used corrugated or solid fibre containers free from foreign materials, mixed and objectionable papers and packed in large machine compressed bales weighing 650 pounds or more.

[8] "Old Kraft Corrugated Containers" shall consist of used containers of 90% to 100% kraft content, clean and dry, free from foreign materials, objectionable and mixed paper and packed in large machine compressed bales weighing 650 pounds or more. If kraft content is less than 90%, the packing shall be designated "Old Corrugated Containers".

[9] "New Corrugated Cuttings" shall consist of new corrugated cuttings of jute and/or kraft from a corrugating plant, or solid fibre or corrugated container converting plant, and shall be free from foreign materials, mixed and objectionable papers. May be packed in small or large bales.

[10] "Boxboard Cuttings" shall consist of clean, dry cuttings from paperboard converting plants or other users of paperboard, free from objectionable and mixed papers and foreign materials, packed in large machine compressed bales weighing 650 pounds or more.

[11] "White Blank News" shall consist of clean, dry, and white news cuttings or sheets, free from mixed and objectionable papers and foreign materials, and packed in large machine compressed bales weighing 650 pounds or more.

[12] "Extra Manilas" shall consist of clean, dry, unprinted manila paper of uniform natural manila color, free from yellow news blanks, paper towels, canary colored blanks, goldenrod and bogus stock, as well as mixed and objectionable papers and foreign materials, and packed in large machine compressed bales weighing 650 pounds or more.

[13] "New Manila Envelope Cuttings" shall consist of clean, dry, new manila cuttings or sheets from envelope factories, free from printed stock of any kind, mixed or objectionable papers and foreign materials, and may be packed in small or large bales.

[14] "No. 1 Hard White Shavings" shall consist of clean, dry, bond or writing paper shavings, free from colors and tints, parchment and groundwood, and from mixed or objectionable papers and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

[15] "Hard White Envelope Cuttings" shall consist of clean, dry, bond or writing paper shavings, free from all colors and tints, parchment and groundwood and from mixed or objectionable papers and foreign materials. May be packed in small or large bales or in securely tied packages.

[16] "No. 1 Soft White Shavings" shall consist of clean, dry, unprinted, all-white bookpaper shavings, free from all colors and tints, parchment, and groundwood as well as mixed and objectionable papers, and foreign materials, and containing not more than 20% coated white paper stock. Must be packed in large machine compressed bales weighing 650 pounds or more.

[17] "Fly Leaf Shavings" shall consist of the trim of books containing some printed material, free from groundwood, mixed and objectionable papers and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

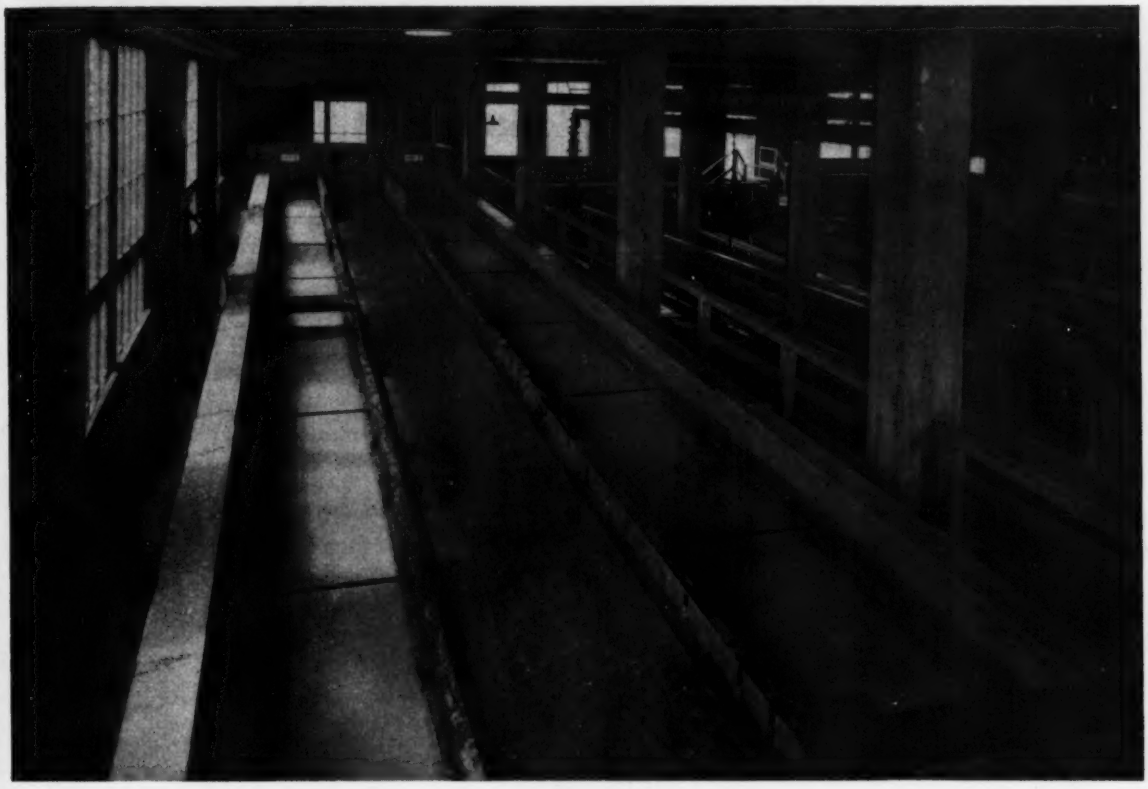
[18] "No. 1 Heavy Books and Magazines" shall consist of dry, clean books and magazines containing not over 2% groundwood papers and 2% packing out-throw (including outside wrappers, wrapping wires and twine), entirely free from shavings and crumpled stock, heavily-inked, deeply-colored, gilt, aluminum and varnished cover stock, lithographed, parchment, groundwood, rotogravure and cover papers, as well as mixed and objectionable papers and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

[19] "Mixed Books" shall consist of dry, clean books and magazines containing not over 25% total outthrow, including kraft, groundwood and outside packing, and shall be free from mixed and objectionable papers and foreign materials. May be packed in small or large bales.

[20] "Overissue Magazines" shall consist of clean, dry, fresh, overrun and misprint unsold magazines and books. May be packed in small or large bales or securely tied packages.

[21] "No. 1 Mixed Ledger (Colored Ledger)" shall consist of white and light-colored ledger and writing waste containing not more than 2% groundwood pa-

840" FITCHBURG" SCREEN PLATES



In the World's Largest Unbleached Sulphite Mill

We are proud of the fact that Puget Sound Pulp & Timber Company, the world's largest unbleached sulphite mill, uses Fitchburg NEW TYPE-DUPLEX SLOT Screen Plates.

Recent capacity tests on these improved plates show capacity beyond all others. In these days when maximum production is vital to all of us, Fitchburg NEW TYPE-DUPLEX SLOT plates are turning in records on every type of pulp, paper and board. They are screening the pulp for the Powder Mills in National Defense. Such preference must be deserved.

FITCHBURG SCREEN PLATE CO., Inc.
FITCHBURG, MASS.

Pacific Coast Representative: KENNETH B. HALL, 816 S. E. TAYLOR, PORTLAND, OREGON

pers and 2% packing outthrow, free from mixed and objectionable papers, and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

[22] "No. 1 White Ledger" shall consist of white ledger and writing waste containing not more than 2% groundwood papers and 2% packing outthrow, free from mixed and objectionable papers and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

[23] "No. 1 Assorted Kraft (Old Kraft)" shall consist of brown kraft waste free from corrugated waste of any kind, mixed and objectionable papers and foreign materials. Must be packed in large machine compressed bales weighing 650 pounds or more.

[24] "New 100% Kraft Cuttings" shall consist of 100% kraft trimmings, cuttings or shavings from strictly new kraft paper stock, and must be free of fibre papers, screening pulp and colored paper of any kind, objectionable and mixed papers and foreign materials. May be packed in small or large bales.

[25] "New 100% Kraft Corrugated Cuttings" shall consist of cuttings, trimmings or shavings from new 100% kraft corrugated stock, and must be free of fibre papers, screening pulp, and colored paper of any kind, objectionable and mixed papers and foreign materials. Must be packed in small or large bales.

List of Objectionable Papers

When used in these definitions:

"Objectionable papers" include carbon, waxed, paraffined, oil-treated, greased, glazed, parchment, asphalt, tar, wall, friction board, book-covers, cloth-bound, heavy cores, tympan, pressboard, used billboard stock, paper-wrapped excelsior, felt furniture pads, paper twine, uncut printers' rolls, and paper strings; and

"Foreign materials" include every non-paper substance that cannot be manufactured into paper, including, but in no way limiting the generality of the above: cellophane, rags, rubbers, strings, vulcanized fibre, metals, and rubbish of all kinds.*

Imperial Paper Co. Elects Officers

[FROM OUR REGULAR CORRESPONDENT]

GLENS FALLS, N. Y., September 15, 1941 — The annual meeting of stockholders of the Imperial Paper and Color Corporation was held recently at which officers and directors for the year were chosen. Re-elected as directors were: A. F. Brown, Louis P. Brown, D. H. Cowles, A. S. Frazier, G. S. Knapp, K. R. McBride, G. F. Mellen, J. H. Pearsall, J. E. Singleton and M. C. Wilmarth, all of Glens Falls; William Rohe, of New York City, and A. L. Emerson, of Warrensburg. The officers elected are as follows: K. R. McBride, president; D. G. Cowles, first vice-president; M. L. C. Wilmarth, second vice-president; J. H. Pearsall, treasurer; J. J. Clarke, assistant treasurer; A. S. Frazier, secretary; and H. J. Hall, assistant secretary.

A. J. Browning Goes To S.P.A.B.

Albert J. Browning, president, United Wall Paper Factories, Inc., Chicago, Ill., has been appointed special assistant for the Supply, Priorities and Allocations Board, Washington, D. C., to handle various matters in connection with different phases of the program of the board.

Scott Buys International Plants

The Scott Paper Company, Chester, Pa., and the International Paper Company have signed an agreement whereby a subsidiary of the Scott Paper Company is scheduled to purchase on Monday, September 22, from the International Paper Company and certain of its subsidiaries plants and manufacturing facilities located at Marinette, Wis., and Glen Falls, N. Y.

The Scott Paper Company proposes to operate these mills as a separate organization through its wholly-owned subsidiary, the Marinette Paper Company of Marinette, Wis.

RAYMOND C. MATEER

These mills produce primarily toilet tissue, facial cleansing tissue and paper towels. Their sales of these products amount to approximately $5,000,000 annually.

Raymond C. Mateer, vice-president of the Scott Paper Company, has been elected president of the newly-constituted Marinette Paper Company and will direct its operations.

Sales Organization Building Warehouse

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—The International Cellucotton Products Company of Chicago, which sells products of the Kimberly-Clark Corporation, Neenah, Wis., is building a large warehouse at Memphis, Tenn. The structure, of 2-story fireproof construction, will cover a ground area of 120 by 300 feet. Work was started about a month ago, and the building will be ready for use about the middle of November.

Dr. Lewis at Chemical Meeting

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—Dr. Harry F. Lewis, dean of the Institute of Paper Chemistry, Appleton, Wis., attended the fall meeting of the American Chemical Society at Atlantic City, N. J. September 8 to 12, taking part in the cellulose division program. He also attended a division meeting of the National Research Council.

N.P.T.A. Meeting Attracts Large Attendance

Annual Fall Session of the National Paper Trade Association At Stevens Hotel, Chicago, Sept. 15-17, Most Largely Attended In Recent Years — Defense and Other Important Topics Discussed.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, Ill., September 22, 1941—Paper trade executives, nearly 500 of them reporting before the final registration was completed, participated eagerly and attentively in the program of the National Paper Trade Association during the Fall meeting held at the Stevens Hotel in Chicago, on September 15-17 inclusive.

It was the type of convention which is the dream of the trade association secretary. Attendance was greatest since NRA days. Speakers discussed the things paper men were so anxious to hear about. Informal discussions brought out the story of paper and defense. Committee meetings and reports got more than ordinary attention because the paper industry was and is gearing itself to meet the challenge laid down by the Government of the United States.

OPM Repesentative Defense Needs

The man who put the issue squarely up to the paper industry was Norbert A. McKenna, chief of the pulp and paper section of the Office of Production Management. Square jawed and firm lipped, Mr. McKenna outlined the wants of the Government and then did a good job of answering questions fired at him from the floor. His entire philisophy was expressed when he answered a question concerning standardization of sizes and said "We are going to do nothing arbitrary. We are going to take counsel from both sides of every transaction, from the paper manufacturers, and from you fellows and your customers. We are going to stand in the middle and judge what is equitable and fair." The industry indicated that it liked the philosophy.

Prior to that, Mr. McKenna pointed out a potential shortage of 5 million tons of paper in 1942, an estimate based on a demand and supply analysis made for the Supply Allocations and Priorities board. To overcome the anticipated shortage in paper goods of all kinds, Mr. McKenna urged the industry to standardize its products, conserve supplies and reduce the amount of pulp going into the same amount of paper. He frankly agreed with the comment that the government wastes paper but he attributed it to "natural awkwardness" and admitted that government "was, is and will be the most profligate user o feverything."

Announces Ten-Man Committee

To give the paper industry proper representation in cooperating with the Government in standardization of products and conservation of supplies, Mr. McKenna announced a ten man Committee "with only three weeks to give its recommendations" and he said this Committee had a splendid chance to avoid unemployment arising from priorities problems with a minimum of disturbance. The Committee and the industry, he declared, "can do the job better than government and we desire to leave the administration of industry to itself and keep government interference at a minimum. The alternative is allocations, priorities and bureaucratic control."

Paper Men Appointed to Committee

The Committee appointed is as follows: George E. Carpenter, Carpenter Paper Company, Omaha; Charles A. Esty, Carter-Rice & Co., Corp., Boston; W. N. Gillett, Chicago Paper Company; P. A. Harris, Graham Paper Company, St. Louis; R. C. Kettles, Jr., Charles F. Hubbs & Company, New York; Perry W. Lesh, C. P. Lesh Paper Company, Indianapolis; A. W. Leslie, John Leslie Paper Company, Minneapolis; A. M. Miller, Central Ohio Paper Company, Columbus; Sydney L. Wellhouse, National Paper Company, Atlanta and Harold A. Zellerbach, Zellerbach Paper Company, San Francisco.

Mr. McKenna's remarks were given at a September 15 afternoon meeting open to both Fine and Wrapping Paper divisions and presided over by Perry W. Lesh, President of N.P.T.A. His remarks were followed by those of Walter C. Shorter of the OPM which went more specifically into the problem presented in Mr. McKenna's statement. From then on the three-day program developed in the well ordered way which characterizes meetings of this big Association, a credit to the management of A. H. Chamberlain and his capable staff.

Fine and Wrapping Paper Divisions Meet

The Fine Paper Division held its own meeting on the opening morning of the session, though the session itself was preceded by a meeting of the Board of Directors on Sunday evening. J. H. Brewer, vice-president of the Division, presided and J. H. Londergan, director of statistical research, threw more light on the production problem of the industry itself. The Certification Board of the Wrapping Paper Division and the Wrapping Paper Merchandising Committee met with G. E. Carpenter and V. J. Schlachter as the respective chairmen.

Tuesday's sessions found the Wrapping Paper Division getting a first hand insight into the problems of the paper manufacturer as A. C. Remley of the Nekoosa-Edwards Paper Company pointed out the job of the manufacturer to wage its fight against restrictions and shortages in attempt to satisfy the jobbers of the country. Further light on demands of the government was furnished by M. D. Schwartz of the Industrial Paper Unit of the Office of Price Administration. To conclude the session Assistant Secretary R. H. Ziegler spoke of the various sectional meetings, the interest aroused in the work of the N.P.T.A. and the increasing willingness of paper merchants to work together in the understanding that it is far better for the industry to meet the emergency confronting it than to turn the job over to bureaucracies.

The Commodity Committee and the Governing Committee of the Wrapping Paper Divisions held conferences during the afternoon as did the Fine Paper Division which went carefully into the now

ever-important subject of Simplification and standardization and developed the ground work for the Government made request for cooperation along these lines.

Formal Sessions End on Wednesday

The formal sessions concluded on Wednesday, September 17 with both Fine and Wrapping Paper Divisions meeting in joint session under the chairmanship of President Lesh. It was here that the industry indicated it had taken to heart the warnings voiced by Mr. McKenna and other speakers as President Lesh outlined the program of the N.P.T.A. and called upon wholehearted support. The report of the Board further indicated that the paper industry was geared to do a job for itself and was and is depending upon every individual member to act as a committee of one to cooperate whenever and wherever asked for aid. J. K. Javits, general counsel, went into the problems of current legislation, price control and taxation and again and again referred to the herculean task of self-regulation ahead.

Sandwiched in between the busy morning and afternoon sessions were important business meetings of the Salesmens Association of the Paper Industry and the Paper and Twine Club. At the SAPEYE meeting on Tuesday noon, President Johnny Johnston and the members discussed how sales executives could best cooperate in the general paper industry program and outlined activities for the coming Fall and Winter months.

The Paper and Twine Club met on the sixteenth with over 300 members and guests jammed into the Tower Ballroom for a session marked by good fellowship and serious consideration of present problems. A quick preliminary program, introduction of honored guests including M. D. Schwartz, chief of the Industrial Paper Unit of the OPA, and musical entertainment preceded an address given by Robert M. Macy, head of the Price Division of OPACS. Mr. Macy outlined the job of his office and clearly indicated that individual voluntary price agreements rather than price ceilings were the hope of the Government executives. He noted that price control ceiling simply gives the President of the United States the power to put price ceilings in effect and urged the industry to avoid the "or else" implications in the price control legislation by doing the job for themselves.

Exhibits Largest on Record

While the industry was concentrating on the excellent and timely speaking program a record breaking list of exhibitors were showing their wares on the fifth and sixth floors of the Stevens Hotel. The Exhibit Committee composed of R. W. Miller, C. E. Roach, J. S. Addison and H. A. Hartinger did itself proud in arranging for displays which were reported to have surpassed any previous efforts. The directory of exhibits itself was a cataloguing not only of lines on exhibit but of the personnel behind the exhibits. The list of exhibitors included: Allied Paper Bag Corporation; American Paper Goods Company; American Paper Merchant; Bay West Paper Company; Better Packages, Inc.; Boston Drinking Cup Company; Brown Company; Brown Paper Goods Company; Central Paper Company; Central Paper Company, Inc.; Cleveland Mill and Power Company; Consolidated Cover Company; Container Corporation of America; Continental Bag Specialties Corporation; Crossett Paper Mills; Crystal Tissue Company; Derby Sealers, Inc.; Dixie-Vortex Company; Forster Manufacturing Company; John M. Hart Company; Herz Manufacturing Corporation; Hoberg Paper Mills; Industrial Tape Corporation; Lily-Tulip Cup Corporation; Loroco Industries, Inc.; McLaurin-Jones Company; Midland Products, Inc.; Milwaukee Lace Paper Company; Nekoosa-Edwards Paper Company; Oneida Paper Products, Inc.; Oval Wood Dish Corporation; Racquette River Paper Company; Rexford Paper Company; Sealright Company, Inc.; Self-Locking Carton Company; Sherman Paper Products Corporation; Sorg Paper Company; Stone Straw Corporation; Sutherland Paper Company; The Tanglefoot Company; Tested Papers of America, Inc.; Tomahawk Kraft Paper Company; Union Bag and Paper Corporation; Velso Products Company; Victoria Paper Mills Company and the Wisconsin Tissue Mills.

To put the climax to one of the most successful conventions ever held by the National Paper Trade Association, many paper executives "stayed over" until Thursday to participate in the annual and final golf outing at the Olympia Fields Country Club and sponsored by the midwest division of the Salesmens Association of the Paper Industry. The event was under the direction of Ed Rolain, golf chairman, who lined up many a reservation while walking through the crowded corridors of the Hotel Stevens.

Let Contract for Powell River Hospital

[FROM OUR REGULAR CORRESPONDENT]

VANCOUVER, B. C., September 12, 1941—Contract has been awarded for erection of the new hospital for the Powell River Company at Powell River, B. C. The project will involve an expenditure of approximately $125,000. Bennett & White Construction Company, Ltd., 510 west Hastings street, Vancouver, B. C., hold the general contract on a tender of $87,000.

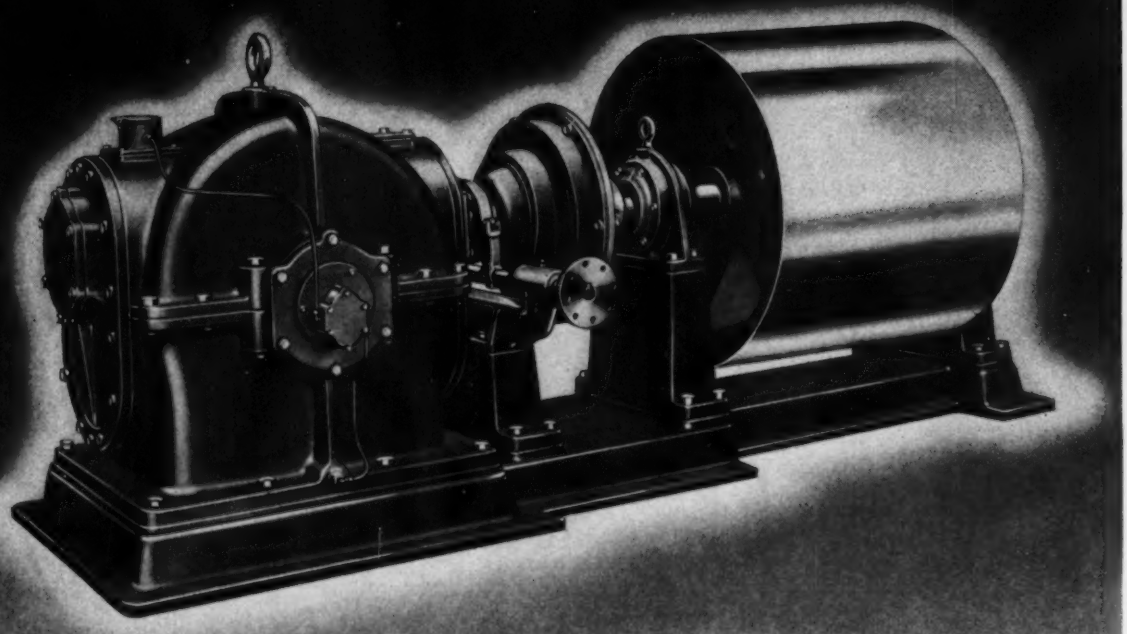
The new hospital will follow the latest in design and equipment for institutions of its type and size. The structure is to be four stories in height, with ground measurement of 134 by 44 feet, and will have a small one story, 13 by 30, wing at one end for matron's living quarters. Construction is to be of monolithic reinforced concrete with architectural concrete facing, and will have a 20-year bonded roof. A steam heating system will be installed, being fed from the steam plant of the Powell River Company, where the electric power and lighting will also be obtained.

Layout of the ground floor will include an X-ray department, physiotherapy department, laboratory, waiting room with separate male and female lavoratories, special emergency entrance leading to an emergency surgery, a large general office, nurses' and help dining rooms, and large main kitchen from which two special electric food elevators will serve the diet kitchens on the three floors above.

The three upper floors, to be given over to patients' accommodation, maternity section and surgical operating department, will have provision for 61 beds, including seven private bedrooms, nine two-bed wards and nine four-bed wards. Special surgical dressing rooms, nurses' stations, and auxiliary service accommodation will be included on each floor, which will also be served by signal call systems and other necessary facilities.

BAGLEY AND SEWALL

HYPOID GEAR DRIVES



THE SINGLE gear type of drives is built in both the spiral bevel or hypoid gear design. In either case, the driving gears are totally enclosed and operate in a continuous oil bath. These drives are fitted with a positive forced-feed oil pump, which assures an adequate supply to all points requiring lubrication.

The entire assembly is mounted on heavy duty anti-friction bearings.

These drives are supplied with clutches of the cut-off coupling type, or equipped with loose pulleys having the clutch mounted integrally with the pulley. Clutches may be either the magnetic or mechanical type as preferred.

These driving units are made in various sizes to operate with all power requirements of a paper machine.

Replacement of any old type drives by these modern methods of driving will definitely prove advantageous in your paper mill.

We will be glad to send you complete information on either type of drive.

THE BAGLEY AND SEWALL COMPANY - WATERTOWN, NEW YORK

FINANCIAL NEWS

New York Stock Exchange

High, Low and Last for Week Ending September 24, 1941

	High	Low	Last
A. P. W.	1⅝	1½	1⅝
Armstrong Cork Co.	29½	28¾	28¾
Celotex Corp.	9¼	8⅞	8⅞
Celotex Corp., pf.	75	72½	75
Certain-Teed Products Corp.	3¾	3⅜	3⅜
Certain-Teed Products Corp., pf.	35½	32	32
Champion Paper & Fibre Co.	22½	22½	22½
Champion Paper & Fibre Co., pf.	106	106	106
Congoleum-Nairn Co.	18⅝	18	18½
Container Corp. of America	15⅝	15	15½
Continental Diamond Fibre Co.	10	9⅜	9⅜
Crown-Zellerbach Co.	14¼	13⅝	13⅝
Crown-Zellerbach Co., pf.	91½	90½	90⅝
Flintkote Co.	14⅜	13¾	13¾
Robert Gair	2⅝	2⅜	2⅜
Robert Gair, pf.	11½	10¾	10¾
International Paper & Power	20	18⅜	18½
International Paper & Power, pf.	70½	69	69¼
Johns-Manville Corp.	71⅜	69	69
Johns-Manville Corp., pf.	....	....	....
Kimberly Clark Corp.	31	29½	29½
MacAndrews & Forbes	30	29½	30
MacAndrews & Forbes, pf.	136½	136½	136½
Masonite Corp.	27¼	26½	26¾
Mead Corp.	9	8	8
Mead Corp., pf.	....	....	....
Paraffine Companies, Inc.	30⅜	30⅜	30⅜
Paraffine Companies, Inc., pf.	....	....	....
Rayonier, Inc.	15½	15	15
Rayonier, Inc., pf.	28⅜	27¾	28
Ruberoid Co.	20	19⅝	19⅝
Scott Paper Co.	39½	38½	39½
Scott Paper Co., pf.	113⅝	113⅝	113⅝
Sutherland Paper Co.	20	19	19
Union Bag & Paper Corp.	11⅝	11	11
United Paperboard Co.	4⅝	4⅛	4½
U. S. Gypsum Co.	60½	57½	59½
U. S. Gypsum Co., pf.	176	176	176
West Virginia Pulp & Paper Co.	20	19½	19½

New York Curb Exchange

High, Low and Last for Week Ending September 24, 1941

	High	Low	Last
American Box Board Co.	5⅛	5	5
Brown Co., pf.	25⅛	24	25
Great Northern Paper	....	....	....
Hummel-Ross Fibre Corp.	....	....	....
National Container Corp.	11	10¼	10¾
St. Regis Paper Co.	2¼	2⅛	2⅛
St. Regis Paper Co., pf.	107	106½	106½
Taggart Corp.	3⅜	3	3

Keyes Fibre Files with SEC

The Keyes Fibre Company of Portland, Me., filed September 20 with the Securities and Exchange Commission a registration statement covering $1,400,000 of first mortgage sinking-fund 4½% bonds due on October 1, 1956. The bonds will be offered publicly at a price to be announced later, but not to exceed par. Underwriters also will be named later.

The net proceeds from the sale of the bonds will be used to provide funds for the retirement of the entire outstanding $1,125,000 of first mortgage 6% serial bonds of the company's predecessor, heretofore assumed by the company, of which $125,000 matures on November 1, 1941, and $1,000,000 is to be called for redemption May 1, 1942; to pay a $100,000 bank loan of company and about $72,000 bank loans made by a subsidiary; and to provide to the extent of the balance of the net proceeds additional working capital of the company.

Soundview Nets $2.41

The Soundview Pulp Company for the eight months to August 31, reports net income of $1,260,361, equal to $2.41 a common share, against $1,527,093, or $2.95 a share last year.

Abitibi Earnings Up

The Abitibi Power and Paper Company, Ltd., reports that its earnings in August were $866,139 before charges for depreciation and bond interest, compared with $802,325 in August, 1940. Included in the figure for last month was $143,442 received in United States exchange.

For the eight months ended on August 31 earnings on the same basis were $5,490,423, against $5,070,944 in the corresponding period of last year.

Shipments of newsprint last month, according to G. T. Clarkson, receiver and manager of the company, were 38,927 tons, compared with 38,655 tons in August, 1940. Present indications are that shipments of newsprint will be about 49,800 tons in September, compared with 36,697 tons in September of last year.

Shipments of sulphite pulp amounted to 9,067 tons in August, against 7,133 tons in August, 1940, and it is probable that these shipments will total about 8,600 tons in September, compared with 6,368 tons in September, 1940.

Sorg Votes $1.50 Dividend

The Sorg Paper Company has announced the declaration of a dividend of $1.50 per share of its series A preferred stock and a dividend of $1 per share on its series B preferred stock.

Both dividends are payable October 1, 1941, to stockholders of record September 22.

C. B. Stiles who made the announcement said: "These dividends are being paid on account of the unpaid cumulative dividends on the two issues of preferred stock."

Robert Gair Pays Dividend

At a meeting of the board of directors of Robert Gair Company, Inc., held September 15, 1941, a quarterly dividend of thirty cents per share in respect of the third quarter of the year of 1941, was declared upon the preferred stock of the par value of $20 per share of the company, payable September 30, 1941, to stockholders of record at the close of business September 25, 1941, without the closing of the transfer books.

A. P. W. Reports Loss

The A. P. W. Paper Company, Inc. reports for the year to June 30, a loss after interest on funded debt of $56,921. No interest was paid on the twenty-five-year 6% convertible notes assented to the plan of voluntary readjustment of funded debt. This annual interest cost, if earned, would have been $45,646, according to report.

Sabin-Robbins Vote Dividend

Directors of the Sabin-Robbins Paper Company have declared a dividend of 20 cents on the common stock, payable October 15 to holders of record October 8.

WHEN your pipe lines are "PYREX" brand Industrial Glass, you need never spend hours locating where in your processing system turbidity, discoloration or other similar difficulties, are originating. The crystal clear transparency of "PYREX" Piping clearly reveals its contents at every processing stage.

And you can rest assured that your "PYREX" pipe line will not be responsible for contamination due to pipe line corrosion. "PYREX" brand Glass has remarkable resistance to all acids and alkalies in solution (except HF). That is why "PYREX" Piping is being increasingly used wherever chemical purity is important.

Because "PYREX" Piping resists thermal shock, it may be flushed with hot water, steam or hot acids. Its smooth, hard surface resists abrasion. It is built for industrial use. Its long life is positive proof of its mechanical strength and ultimate economy.

Corning engineers, with years of experience in the application of "PYREX" Piping, will gladly consult with you. Write to them.

"PYREX" is a registered trade-mark and indicates manufacture by Corning Glass Works.

CORNING
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Pyrex Industrial Glass

CONSTRUCTION NEWS

Memphis, Tenn.—The Sefton Fibre Can Company, 3275 Big Bend road, St. Louis, Mo., manufacturer of fiber containers, has taken over property at 230 West Georgia street, and will improve and expand for new branch plant. A new addition will be built to existing building. Equipment will be installed for large capacity. Cost reported over $250,000, with machinery.

Salem, Ore.—The Oregon Pulp and Paper Company, manufacturer of bond and other writing paper stocks, greaseproof and special papers, has completed plans for new three-story building, 80 x 200 feet, at 315 South Commercial street, to be used primarily for storage and distributing service. It is estimated to cost close to $100,000, with equipment. Erection contract has been awarded to Viesko & Hannaman, 1440 South Thirteenth street, Salem, and work is scheduled to be placed under way at once. Arthur P. Cramer, Bedell Building, Portland, Ore., is engineer.

Chicago, Ill.—The Pioneer Paper Stock Company, 448 West Ohio street, manufacturer of paper goods, has awarded general contract to E. L. Lonergan Construction Company, 203 North Wabash avenue, Chicago, for new three-story addition to plant, about 50 x 50 feet, for expansion in converting department, previously referred to in these columns. Work will be placed under way at once. Cost reported over $50,000, with equipment. William J. Ryan, 43 East Ohio street, Chicago, is architect.

New York, N. Y.—Gosling & Farr, 141 Wooster street, manufacturers of lined paper board specialties, have leased three buildings at Bethune and Washington streets, comprising a six-story structure at 33-37 Bethune street, a three-story adjoining building at 39 Bethune street, and a connecting one-story building at 747 Washington street, designed for garage service. Structures total about 38,000 square feet of floor space and will be remodeled and improved at once for new plant, providing large increase in present capacity. Present plant will be removed to new location as soon as alterations are completed.

Tacoma, Wash.—The St. Regis Kraft Company, 801 Canal street, manufacturer of kraft paper products, has approved plans for one-story addition to mill, to be used for raw material storage. It is reported to cost about $15,000, with equipment. Contract for erection has been awarded to the Howard S. Wright Company, Inc., 407 Yale street North, Seattle, Wash., and work will be placed under way at once. Company is a subsidiary of St. Regis Paper Company, 230 Park avenue, New York, N. Y.

Arden, Nev.—The Blue Diamond Corporation, 1650 South Alameda street, Los Angeles, Cal., manufacturer of wall board and allied products, will begin work on steel frame superstructure for new wall board mill at Arden, recently noted in these columns, requiring over 400 tons of structural steel for initial buildings. These will include a main one-story processing and production building, storage and distributing structures, power house, machine shop and auxiliary buildings. Cost is estimated close to $500,000, including equipment, which will provide for large output. It is proposed to have the new mill ready for service in 1942. The Consolidated Steel Corporation, Eastern and Slauson avenues, has contract for steel work.

Chicago, Ill.—The Central Waxed Paper Company, 5659 West Taylor street, manufacturer of waxed and other processed paper stock, has taken bids on general contracts for alterations and improvements in two-story plant, including interior and exterior work. No estimate of cost announced. Award for work will be made soon. Battey & Childs, 231 South LaSalle street, Chicago, are architects.

Erie, Pa.—The Hammermill Paper Company, East Lake road, manufacturer of writing and other paper stocks, has awarded contract to J. C. Hammond, Security Bank Building, Erie, for substructure for new addition to boiler house at mill, about 40 x 50 feet, recently referred to in these columns. Bids are now being asked on general superstructure contract and award is scheduled to be made soon. Equipment will be installed for increased capacity. Otto C. Schoenwerk, 3420 North Lake Shore drive, Chicago, Ill., is consulting engineer.

Worcester, Mass.—The Shepard Envelope Company, 1 Winona street, manufacturer of commercial envelopes and kindred paper products, has taken out a permit for alterations and improvements in plant. No estimate of cost has been announced. Contract for work has been let to Lewis Neri, 131 North Main street, Millbury, Mass., and will be carried out at once.

Chicago, Ill.—The United Wall Paper Factories, Inc., 3330 West Fillmore street, has adopted a full overtime production in its three main wallpaper manufacturing plants, effective at once, and will develop maximum output schedules, to be maintained for an indefinite period.

St. Louis, Mo.—The American Can Company, 230 Park avenue, New York, N. Y., has awarded general contract to the Norris Construction Company, 59 East Van Buren street, Chicago, Ill., for erection of proposed new plant on South Kingshighway, near Juniata street, St. Louis, where tract of about 30 acres of land recently was acquired. As previously noted in these columns, a department will be installed for the manufacture of a line of fiber boxes and containers, with equipment and facilities for large output. New plant will consist of a main one-story production unit, 620 x 1035 feet, and two adjoining buildings, 100 x 375 feet, and 50 x 175 feet, respectively, for machine shop and general service, and for office purposes, in order noted. Cost estimated about $2,000,000, including equipment. Work is scheduled to begin at once. C. G. Preis, first noted address, is company architect and engineer.

Urbana, Ohio—The Howard Paper Company, manufacturer of bond and other writing paper stocks, has awarded general contract to E. Elford & Son, 555 South Front street, Columbus, Ohio, for extensions and improvements in building at

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Gives You
LONGER BEARING LIFE
AT
HIGHER SHAFT SPEEDS
UNDER
HEAVIER LOADS

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RADIAL LOADS
Carried at Right Angles to the Roller Surface

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Today's emergency production demands a return to fundamentals . . . a reduction of every design to its simplest form . . . a decrease in wear and service attention and cutting of friction drag.

Rollway pure-radial and pure-thrust Roller Bearings help to achieve that simplification. They reduce every complex load to simple, right-angled components that can be carried on solid-cylindrical rollers. That means rollers of longer line contact and greater cross-section area. It means a stronger bearing in a limited space. Above all it means *longer bearing life* at *higher shaft speeds* under *heavier loads*.

Rollway Bearings not only make lubrication simpler and easier compared with plain bearings . . . not only reduce down-time due to bearing replacements . . . but in case after case, they actually enable bearing "change over" for heavier continuous loads without redesign of the size relation of other parts.

★ **KEEP DEFENSE ROLLING..ON ROLLWAYS**

Send us your plans today for bearing analysis. Our engineering recommendations may save you money and future trouble.

ROLLWAY BEARING COMPANY, INC., SYRACUSE, N. Y.

BUILDING HEAVY-DUTY BEARINGS SINCE 1908 **BEARINGS**

mill, about 30 x 40 feet, used for office and general operating service, recently referred to in these columns. Work will be placed under way at once. No estimate of cost announced. Mueller & Hair, Hamilton Hotel Building, Hamilton, Ohio, are architects.

West Point, Va. — Chesapeake Corporation, manufacturer of sulphate pulp products, has plans under way for addition to steam-electric generating station used for service at mill. New equipment will be installed for increased capacity. Cost estimated close to $100,000.

New Companies

New Hyde Park, N. Y.—The Amalgamated Paper Corporation has been chartered with capital of $20,000, to deal in paper products of various kinds. New company is represented by Joseph A. Wolfert, 500 Fifth avenue, New York, N. Y., attorney.

New York, N. Y.—Kwik-Dri Paper Products, Inc., has been organized with capital of 200 shares of stock, no par value, to deal in special processed paper stocks. New company is represented by Meyer Shapiro, 51 Chambers street, New York, attorney.

Detroit, Mich.—The American Gravure Products Company, 1119 Webb avenue, has been organized with capital of $50,000, to deal in fine papers of various kinds. Archibald H. McDonald, address noted, is principal incorporator and representative.

Marinette, Wis.—The Marinette Paper Company has been incorporated to manufacture and deal in paper products of various kinds. It is said that a local mill will be operated. The incorporators include Clarence A. Davis, Howard and A. P. Lehner, all of Marinette.

New York, N. Y.—The Wellworth Paper Stock Company, Inc., has been chartered with capital of 100 shares of stock, no par value, to manufacture and deal in processed paper stocks for different service. New company is represented by Francis M. Verrill, 16 Court street, Brooklyn, N. Y., attorney.

Kimberly-Clark Increases Wages

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—Wage increases of two cents per hour for women and four cents for men went into effect Sunday, September 21, at mills of the Kimberly-Clark Corporation, Neenah, Wis., following collective bargaining conferences September 16 and 17 of the management and the employee unions.

Announcement of the increase was made by George J. Ritten, president of the Wallpaper Workers Union of the Fox River Valley; O. K. Hannemann, president of the Paper Mill Workers Union, Kimberly, Wis.; Dorwald Schomisch, president of the Lakeview Independent Union, Neenah. Wis., and William Dickson, president of the Paper Mill Workers Union, Niagara, Wis.

The two-cent increase for women brings the basic rate in the Lakeview, Badger-Globe and Kimberly mills up to 53 cents per hour, and in the Atlas and Kimlark plants to 51 cents per hour. The basic rate for men in all of the Wisconsin mills, by virtue of the 4-cent increase, will be 67 cents per hour for day workers, and 70 cents for shift workers.

Howard B. Morse Dead

Funeral services were held in Sherborn, Mass., on Sunday, September 14, for Howard B. Morse, 57, of West Roxbury, Mass., and Atlanta, Ga., whose work for one of the large paper mills in the East had taken him into many of the pulpwood centers of the United States. He was a brother-in-law of Lyndon B. Tewksbury, of Spaulding & Tewksbury Company, Inc., paper board dealers of Boston. He was superintendent of the C.C.C. camps in the southeastern United States, from Georgia to Texas.

Mr. Morse had long been affiliated with forestry and the pulp industry. He was a graduate of the Forestry School of Biltmore.

He served as Captain of Artillery in World War No. 1. In recent years he had been in charge of a large number of the C.C.C. camps, work for which he was well fitted by his early training and by temperament.

Of sterling character, genial, friendly and sincere, his passing will be mourned by a host of friends.

He met his death in Biloxi, Miss., while swimming, struck by a speed boat, whose pilot evidently knew nothing of what had happened.

Surviving Mr. Morse are his wife, two daughters, Miss Jane Leigh Morse, West Roxbury, and Mrs. Dana Hinckley, Portland, Me., a son, John, now in Dartmouth College, and a sister, Mrs. Tewksbury of Hingham, Mass.

Canada China Clay Reorganizes

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., September 22, 1941—Paper manufacturers have been interested in announcements that have been made from time to time regarding the activities of Canada China Clay, a new enterprise, reported earlier in the year to be about ready to supply the paper trade with China clay at an attractive price.

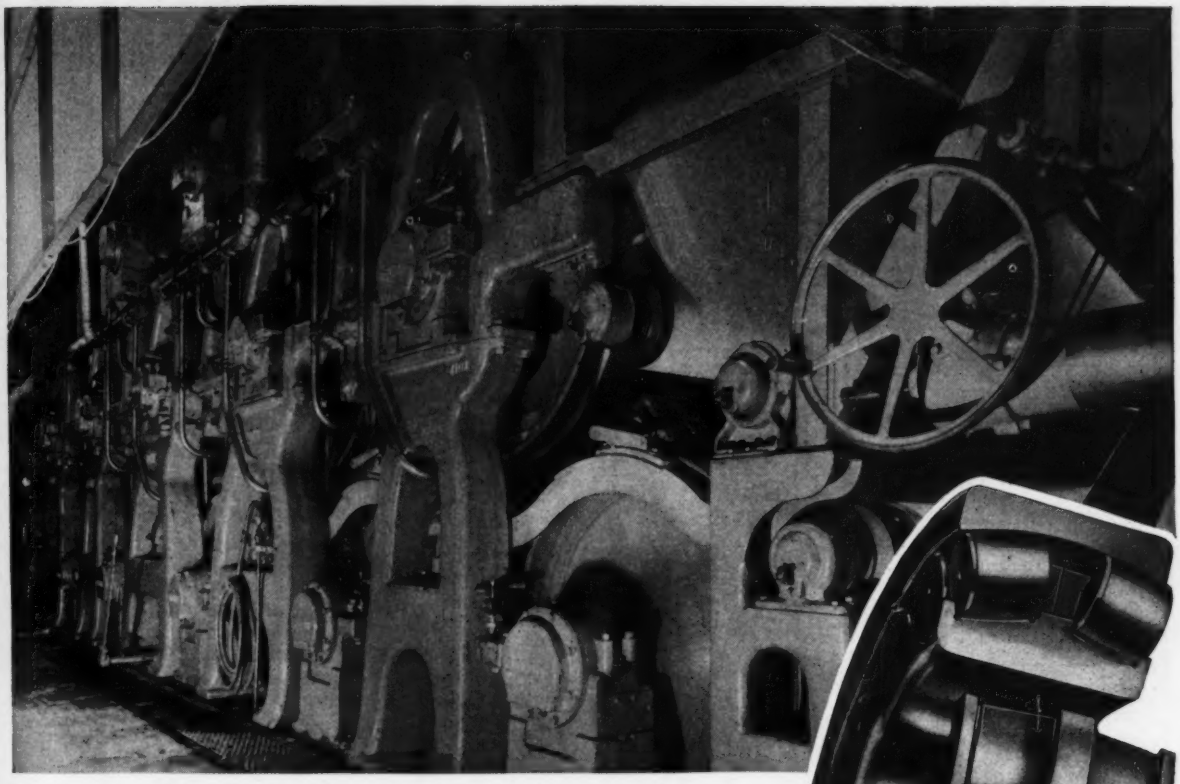
As reported in these columns on a previous occasion, Noranda Mines has a large financial interest in the proposition. According to the latest announcement, Canada China Clay on September 15 approved a new financing deal with Noranda Mines which will result in Noranda eventually securing control.

Under the deal as approved, Noranda agrees to advance a further $150,000 to bring the property into production, bringing their total advances to $400,000. A new company is to be formed to take over the property, Canada China Clay, the present company, to receive 144,950 shares as well as having all debts and liabilities paid. Noranda's advances are repayable out of net profits after a working capital position of $75,000 has been established.

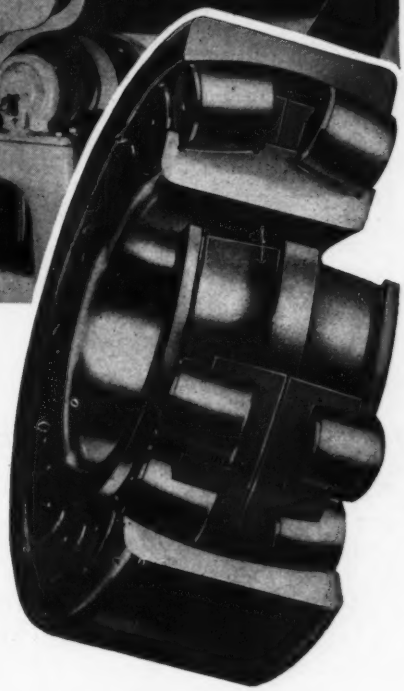
Kieffer Adds to Plant

The Kieffer Paper Mills, Ewing, Ind., announces that it has built a 40 by 40 addition adjoining the finishing room and has made various improvements to the building program started last year. The improvements include a cyclone blower system for removing dust from the saws. The mill has been rewired, painted, new skylights added and frigidaire drinking fountains installed.

The company is contemplating the erection of a 105 by 120 addition to be used for fabricating and storage purposes.



Dryer section consisting of 39 dryers, 60" in diameter and divided into two independent sections, built by Beloit Iron Works for the Longview Fibre Company. Besides these dryers, SKF Bearings are on the double calender stack, suction press rolls and many miscellaneous locations.



Beloit Does it Again

WITH SKF BEARINGS

Congratulations, Beloit Iron Works. You know a better way to keep the dryer section of the No. 5 200-inch Fourdrinier Paper and Board Machine at Longview free from bearing trouble than by depending on an oil can. You picked SKF Bearings to permit shaft expansion and contraction without imposing extraneous thrust loads on bearings or side frames. In short, you put the right bearing in the right place.

SKF INDUSTRIES, INC., PHILA., PA.

4810

ROLLER SKF BEARINGS

Sets Paper Board Prices

WASHINGTON, D. C., September 24, 1941—Maximum prices now prevailing under voluntary agreements covering all grades of paper board sold by leading producers east of the Rocky Mountains will be incorporated shortly into a formal price schedule, Leon Henderson, administrator, Office of Price Administration, announced today.

The schedule, which is nearing completion, will go into effect on October 1, 1941, when the present voluntary agreements will expire.

Ceiling prices for the three base grades will be the same as those specified in the voluntary agreements, i.e., $45 a ton for chip board, $60 a ton for single manila lined board and $75 a ton for white patent coated news board. Differentials, up and down, in line with the present agreements will be established for other types, depending upon weight, grade, quantity.

All types of paper board used in the manufacture of set-up paper boxes, folding cartons and shipping containers will be covered. Top prices for the shipping container grades will be stated in dollars per 1,000 square feet, rather than in dollars per ton, as are the grades used in set-up paper boxes and folding cartons.

Issuance of the price schedule for paper board sold east of the Rockies will follow recent announcement of maximum prices upon the principal grades of waste paper, the main source of raw material for the production of paper board. The waste paper schedule also will go into effect on October 1.

OPA has no present intention of establishing ceiling prices for board sold west of the Rockies, since the voluntary agreements with West Coast manufacturers do not expire until December 31, 1941, and have been operating satisfactorily.

To Keep Industries Running

An important declaration of policy affecting the continued operation of American industry was made on September 23 by the Supply, Priorities and Allocation Board, of which Vice-President Henry Wallace is the head. This policy will enable all industries to obtain essential repair parts for the normal maintenance and operation of plants and thus keep manufacturing plants in good running condition to meet the emergency expected to follow the conclusion of the unlimited emergency period.

The advantages of this plan, as explained by Donald H. Nelson, Executive Director of SPAB, is extended to all industries conforming to the following requirements.

1. A pledge to keep inventories at minimum operating levels, including some method of reducing present inventories if they are swollen. This will be accompanied by an inventory control regulation.
2. A pledge to use all possible methods of conservation of critical materials.
3. An agreement to simplify design wherever possible.
4. A promise to seek methods of substituting materials for those in which the supply situation is tight.

A committee will be named to work out details.

Indicating the demand for materials, the OPM bureau of research and statistics reported that an analysis of projects for national defense and of British war orders in the United States shows a total of $60,016,000,000 by the end of August.

Pulp in National Defense

This year's Eastern States Exposition held in Springfield, Mass. September 14-20 was primarily devoted to national defense. The officers and trustees of the mammoth industrial and agricultural show requested that exhibitors plan their displays to tell the story of their connections with national re-armament and this program had the hearty support of President Roosevelt and the U. S. Army.

Indicative of how New England firms, long engaged in peacetime industry, have been called for defense was the display of a company well known to the pulp and paper industry, Brown Company of Berlin, N. H. The Brown Company display included purified cellulose for gas mask filters and nitro-cellulose purposes, fibre conduit for air fields and naval bases, liquid chlorine, paper towels for industrial sanitation, paper for fabrication into sandpaper to polish airplane surfaces, as well as other products that indirectly have a place in the industrial defense program.

This portrayal of the contributions of one major producer helps to illustrate the importance of the pulp and paper industry in these critical times.

It also suggests the heavy defense load being carried by the pulp producers. This is bound to cause delays and dislocations in the normal business of the paper industry. But although business is upset today, the pulp and paper industry is doing its share for national defense.

New Link-Belt P.I.V. Gear Catalog

Announcement is made by Link-Belt Company, 2045 W. Hunting Park Ave., Philadelphia, that it has issued a new, 52-page catalog and data book No. 1874 on the Link-Belt P.I.V. Gear variable speed transmission—its positive, infinitely variable all-metal chain gear that gets any desired speed instantly and maintains it accurately.

Units of ½ to 15 hp capacity, with speed ratios of up to 6 to 1 are tabulated, illustrated and described. Speeds, torque ratings, dimensions, weights, and other data are given for all seven sizes, each available in five standard types, horizontal and vertical mountings. Many pictures of actual installations throughout the industries are shown.

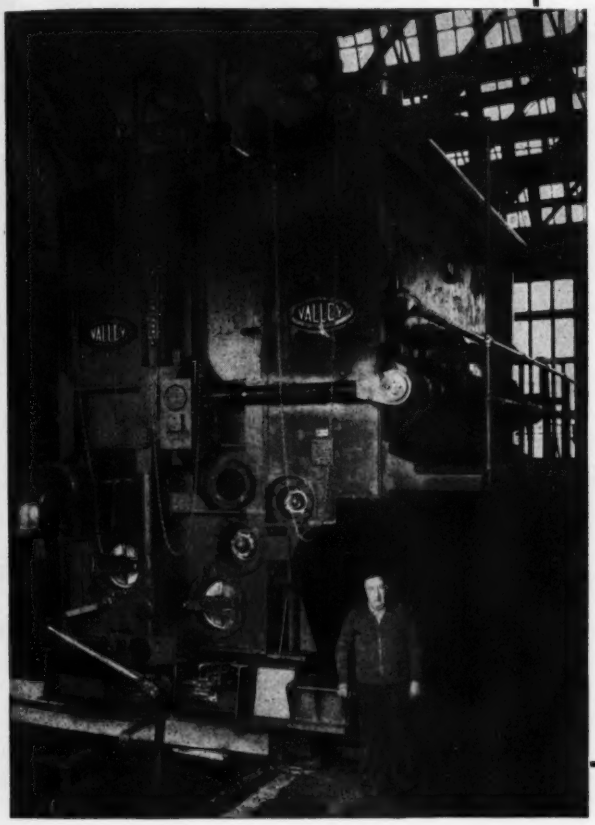
This book No. 1874 is an entirely new presentation; a new book in every sense of the word, not just a revision of previous ones—and it is much more complete. A copy will be sent to any interested reader upon request.

Paper Strike Continues

A strike, called two weeks ago by the Paper Workers and Distributing Trades Union, Local 447, New York, continues at this date to seriously affect the delivery of paper to printers, stationers and other consumers.

Negotiations between the union, an affiliate of the American Federation of Labor, and the employer group, the New York Paper Trade Association, met on September 23 to discuss the situation. It is understood that the strike has practically closed fifty-eight of the larger paper houses, affecting 450 employees, about half of whom are reported to be members of the union.

20 ft. High—214 in Wide—110,000 lb.



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INLET and HEAD BOX

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to assure

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- MINIMUM BROKE
- IDEAL FORMATION
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Only VALLEY CAN SUPPLY

Tell us about your problems. We are here to cooperate with you.

—THE PATENTED VOITH DISTRIBUTING ROLL

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Freer-Flowing Mixes at Higher Total Solids—

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CHLOR-GUMS

These are thin chlorinated starches especially designed to yield stable, free-flowing coatings without causing those appreciable reductions in pick-tests usually associated with thin mixes.

Chlor-Gums produce a more uniform bond throughout the coating film, thus giving higher gloss and freedom from dusting.

National Starch Products Inc.

820 GREENWICH ST., NEW YORK

Chicago — Philadelphia — Boston — San Francisco

And All Principal Cities

Boy Scouts to Save Waste Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 24, 1941—The Boy Scouts of America, 1,500,000 strong, will enlist in the national defense waste paper campaign this week at the request of Leon Henderson, Administrator of the Office of Price Administration.

Dr. James E. West, Chief Scout Executive, in bulletins mailed yesterday to 20,000 scout leaders called for local waste paper collection drives in every community that has a scout troop. This means every city and town of more than 1,000 population and many smaller hamlets.

Price Administrator Henderson in a telegram to Dr. West said:

"I was delighted to learn that the Boy Scouts of America will give its wholehearted cooperation to our national waste paper conservation program. The need for waste paper and rags to meet the present defense requirements is becoming more acute each day and the aid of your group in collecting every available supply of these critical materials will constitute a most important contribution to our national defense effort. Problems of conservation have been historically a major phase of Boy Scout activity and have always been regarded as directly identified with good citizenship. I know of no other national organization whose personnel, objectives and experience better qualify it for this great project and I am satisfied that the Scouts will play a most constructive part in its success."

The national waste paper salvage campaign has been developing since September 7 with central collection offices being established in 33 principal cities by the conservation committee of the Waste Paper Consuming Industries.

The campaign has the active support of the OPA and the OPM Conservation Bureau because paper board boxes are needed in increasing quantities for packing and transporting many defense items. Waste paper is the principal raw material used in the manufacture of paper board boxes.

The Boy Scouts will carry the waste paper collection beyond the limits of the paper board industry's drive. In the 33 cities where the campaign has been scheduled they will cooperate with the industry committee.

Where scrap dealers are not available, as in small towns and rural areas, the scouts will haul the paper to the most convenient collection center. The waste paper will be sold at current market prices, and the proceeds will be used by scout troops for whatever purpose they select.

Dr. West in his bulletin pointed out that the Boy Scout drive was designed to supplement the collection of waste paper through the normal trade channels and not to disturb it.

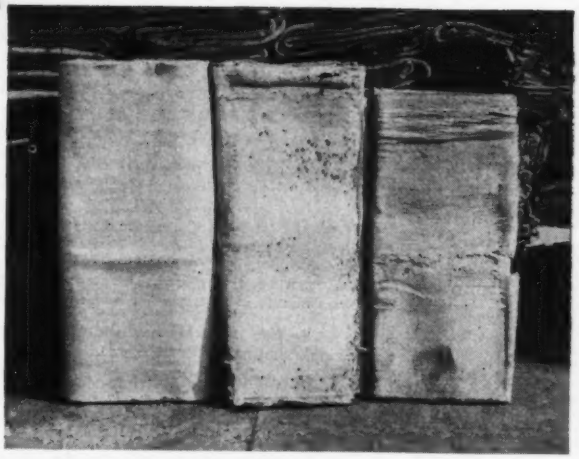
Likewise, he suggested that while the Boy Scouts are taking the lead their activity should not foreclose other community organizations from participating in the campaign.

"The paramount consideration," he said, "should be the development of the most effective methods to accomplish the results desired in relieving the acute shortage of waste paper."

DOWICIDES PRESERVE LAP AND PULP STOCK

Use Dowicides

- To prevent stain and decay on pulp wood.
- For control of slime conditions.
- To prolong felt life.
- For rot and termite-proofing.
- For mold-resistant paper products.
- To preserve proteins, starches, and other coating materials.
- To reduce maintenance costs.



FOR THE PRESERVATION of Lap Stock, DOWICIDE* F (Sodium Tetrachlorphenate)—sprayed on the lap sheet at the wet machine—is proving an effective control.

DOWICIDE F is water soluble but on contact with the pulp it is precipitated as the phenol form—water insoluble—and is therefore held by the pulp for greater protection against germination of spores and development of mold growth.

DOWICIDE G (Sodium Pentachlorphenate) will prevent mold growth in pulp stock and leaves no residual odor. It will also prevent pulp souring in the system over shut-down periods.

For more complete information on these and other uses for DOWICIDES in the paper industry write to Dow.

*Trade Mark Reg. U.S. Pat. Off.

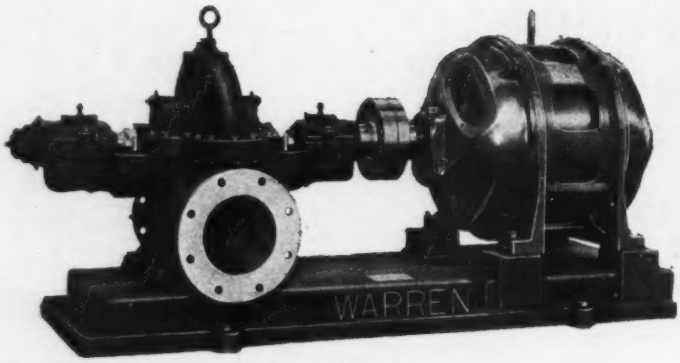
Working with you DOW *for America*

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

New York, Chicago, St. Louis, San Francisco, Seattle, Los Angeles, Houston

PUMPS

that keep up with the mill



That Warren Pumps have the ability to meet the increased demands of their jobs is being proven every day. Here is a typical case:

At the time of their installation at a well known Eastern Paper Mill in 1934, 7 Warren Pumps were called on to handle 800 gallons of white water a minute. Then the capacity of the mill increased—so the operating speed of the Warren Pumps increased also, to obtain the capacity of 900 gallons per minute. Now that the tonnage of the mill has again been increased, the same 7 pumps are obtaining 1,000 gallons a minute by operating at a still higher speed themselves.

If this is the kind of performance *you* want, specify Warren on your next pump replacements or additions.

"A Warren Recommendation is never Compromised"

WARREN PUMPS

Warren Steam Pump Co., Inc., Warren, Mass.

Conserving Supply of Chlorine

Because of the necessity of conserving the supply of chlorine in order to meet the requirements for defense uses and essential civilian needs, the Office of Production Management requests that each pulp or paper manufacturing company comply with the following directive:

Effective September 22, 1941, the following practices shall prevail:

I. The following pulps shall be exempt from this directive:

a. High Alpha Pulps (not less than 90% Alpha Cellulose content)
b. Dissolving Pulps
c. Nitrating Pulps
d. Pulps in which chlorine is a processing rather than a bleaching chemical. Applications for such exemptions under subparagraph (d) shall be made to this Office and should be adequately documented.

II. No pulp or paper manufacturing company shall consume, on a quarterly basis, any more chlorine for bleaching rag stock, than 80% of the average consumption during the six months ending July 31, 1941.

III. As determined either by the General Electric brightness tester or the tester developed by the Bureau of Standards, provided the latter is correlated, the brightness of the following pulps shall not exceed 76:

a. Bleached Sulphite
b. Bleached Sulphate

IV. As determined either by the General Electric brightness tester or the tester developed by the Bureau of Standards, provided the latter is correlated, the brightness of the following pulps shall not exceed 74:

a. Soda Pulp
b. Waste Paper when used for conversion into bleached papers.

V. Until adequate brightness standards for paper are established, no pulp or paper manufacturer shall change the proportion of bleached, semi-bleached and unbleached pulps which presently obtains in the manufacture of any specific grade of paper, for the purpose of evading the restrictions on chlorine consumption effected by this directive, or to establish competitive advantages over manufacturers not enjoying adequate supplies of bleached pulps. No manufacturer shall increase the brightness of any paper beyond that now in effect.

VI. No pulp or paper manufacturing company shall consume on a quarterly basis any more chlorine in the manufacture of semi-bleached grades than 70% of average use for six months ending July 31, 1941.

VII. Pulp and Paper mills manufacturing their own chlorine supply shall so conduct their operations that the resulting effect of the pulps and papers manufactured shall be similar to that obtaining in other mills and so that no competitive advantage shall rest with the captive mills.

VIII. Exceptions to the above directive may be taken up with the Pulp and Paper Section of the Office of Production Management, and granted, if the evidence submitted proves unnecessary hardship. Such applications should be fully documented.

How You Can Get A Good Start Toward INCREASED PRODUCTION

YOU can get a good start toward increasing your production by starting at the beginning . . . with your process water.

You need plenty of good process water to make good paper in increased tonnage . . . and you can get plenty of good process water with ample Norwood Filters in good condition.

By doing a bang up job of filtration, Norwood Filters give you better process water . . . filtered at the maximum speed consistent with the quality you need.

Start at the beginning to increase production. Start now by checking up on your filter capacity and condition. Then put your problem up to Norwood's engineers . . . men with nearly half a century of filtration experience in the paper field.

Ask for Engineering Data Units

Get a Good Start And a Good Finish With

NORWOOD

WATER FILTERS AND PAPER FINISHING MACHINERY

THE NORWOOD ENGINEERING COMPANY

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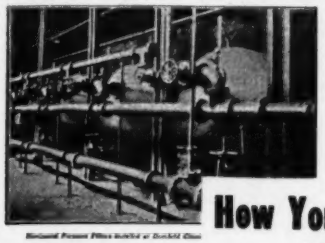

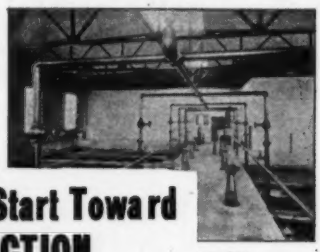

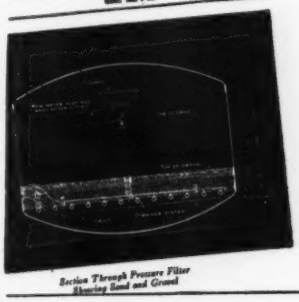

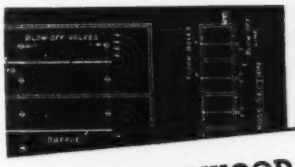

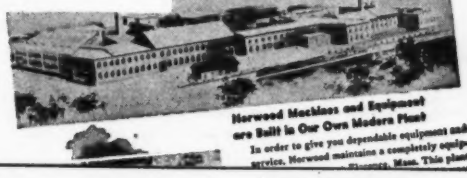

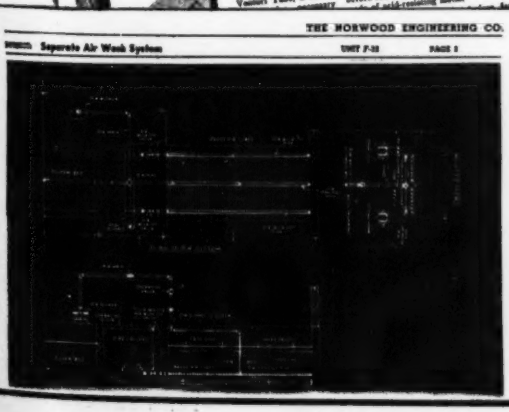

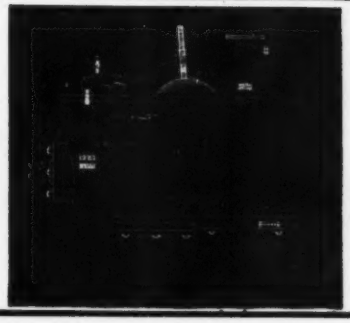

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FOR ECONOMICAL MATERIALS HANDLING

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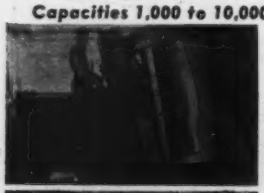
- FORK TRUCKS
- PULP AND BALE HANDLERS
- PAPER ROLL HANDLERS
- LOAD CARRIERS
- TRACTORS — CRANES

Capacities 1,000 to 10,000 Lbs.

Heavy-duty, center-control fork trucks—telescopic tilting, tiering type for low-cost roll storage and transportation. Capacities 3000 to 6000 lbs.

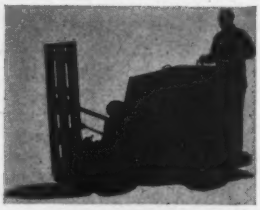


☆ Center-Control 3000 to 6000 lb. capacity motorized revolving paper roll handlers.

☆ Center-Control 6000 to 7000 lb. capacity heavy-duty, motorized revolving paper roll handlers.

☆ Box-car bale and roll unloader for single tier storage. 1500 to 2500 lbs.

☆ Box-cars can be loaded and unloaded in record time — with motorized roll upender. Capacities up to 3000 lbs.



☆ Chisel type pulp handlers for box-car loading, unloading and stacking.

☆ 6000 lb. capacity low-lift and high-lift trucks for skid transportation of small rolls and flat stock.

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AUTOMATIC TRANSPORTATION CO.
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78 W. 87th St. CHICAGO, ILL.

Pulpwood Cutting

The Woodlands Section of the Canadian Pulp and Paper Association has recently published a very interesting and useful book by Alex. Koroleff, Forester for the C.P.P.A. on Pulpwood cutting. It is based on an investigation conducted by the Woodlands Section in cooperation with nine Canadian companies.

This book deals with the efficiency and technique of pulpwood cutting and combines practical operation with good management procedure.

In his summary Mr. Koroleff states: "The chief object of this study is to determine what are the efficient methods and the common faults in the conventional technique of pulpwood cutting. This information is required to facilitate the elimination of waste effort in our woods operations, through appropriate instruction of the workers, etc. A detailed stop-watch record of the performance of 120 cutters was obtained for a total period of 1200 hours. Poor cutters took 55% longer than good cutters per unit of wood produced. Good and faulty practices are presented."

Some of the subjects included are as follows: Distribution of cutters time; Influence of individual factors on cutters output; Axes and bucksaw use and maintenance; Technique of cutting; Sequence of working steps; Branching; Assembling and piting; Summer vs winter cutting; Safety; Nonworking time and other interesting topics.

Those who have attended any of the semiannual sessions of the C.P.P.A. Woodlands Section could not fail to be impressed by the businesslike way in which this organization carries on its work. The subjects discussed are vital to the efficient woods operations and the Canadian industry finds it a good investment to send their foresters, woods managers and other woods specialists to the meetings. It has been a long stride from the casual woods operations of a generation ago to the present degree of efficiency. This advance has been in a considerable measure due to Alex. Koroleff's leadership and the fine cooperation that he has received from the Canadian pulp and paper industry.

Copies of Mr. Koroleff's book may be obtained from the Woodlands Section of the Canadian Pulp and Paper Association, 3420 University street, Montreal, Que. at $3.50 per copy.

Smith Paper Co. Makes Repairs

COHOES, N. Y., September 22, 1941—Extensive repairs are now under way at the former Harmony Mills property recently leased to the Smith Paper Company, of Lee, Mass. The warehouse occupies almost a whole block in Jay street. The improvements also include the repairing and relaying of about a quarter-mile of the spur railroad track as well as building up the roadbed. The spur track extends from the main line of the New York Central to the loading platforms of the warehouse. The Smith concern plans to use the building for the storage of flax used for the manufacture of special grades of paper.

Files Restraint Suit

The Administrator of the Wage and Hour Division, United States Department of Labor today filed suit in the Southern District Federal Court seeking to restrain one of the largest New York sample card companies from violating the converted paper products wage order which recently went into effect.

The firm is Premier Sample Company, Inc., of 137 Varick Street, New York, N. Y., where it is engaged in the manufacture, sale and distribution of sample cards. It employs about 183 employees in its business. The sample cards and books are not only sold across state lines, but are also sold to many New York City firms to facilitate their interstate commerce business in dresses, blouses, piecegoods, and similar lines.

The converted paper products wage order was promulgated by General Fleming, Administrator of the Wage and Hour Division, United States Department of Labor, the plaintiff in the above described action, and became effective on June 30, 1941. It prescribes various rates for the different branches of the industry. The minimum rate for sample cards, the complaint alleges, is thirty-eight cents (38c) an hour. The complaint charges that the firm failed to pay the minimum rate to many of its employees, and failed to pay time and a half compensation under the Act for overtime hours worked by the employees of the company.

Arthur J. White, regional director of the Wage and Hour Division, under whose supervision the investigation was conducted, stated that so far as he knew this was the first case of its kind in the country, and certainly the first case in the New York region. He added that similar wage orders had been promulgated by General Fleming in other industries and that employers generally should be extremely careful to ascertain whether any specific wage order is applicable to their businesses.

In this case, he pointed out, the action was initiated because many sample card firms, including the Premier Sample Company, Inc. denied the applicability of the wage order to their businesses.

WINDING UP A BOON OF PULP WOOD

Cooperation is indispensable within an organization and between allied industries — especially so in the manufacture of satisfactory paper makers' felts.

Draper Representatives are anxious and able to cooperate with you in the design and production of the felts best suited to your purposes.

Let's get together and pull together for better felts.

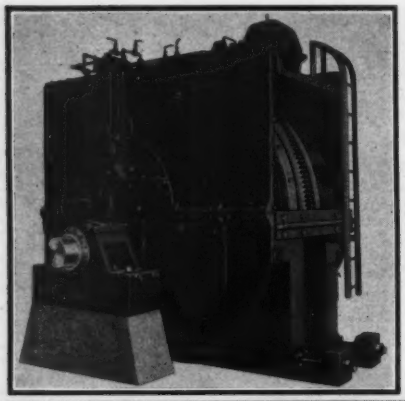
Draper Felts Favor Efficiency

DRAPER BROTHERS COMPANY

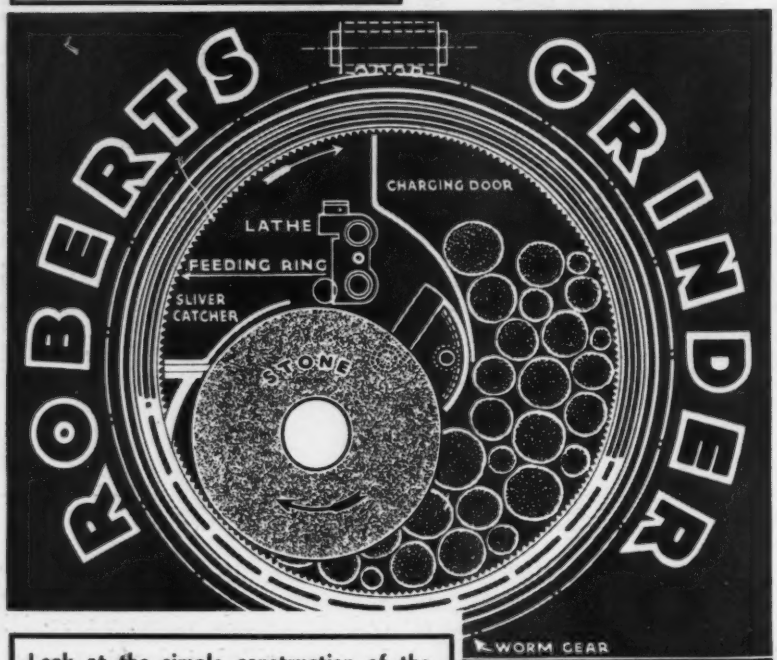
Woolen Manufacturers Since 1856 CANTON, MASS.

OUR REPRESENTATIVES *to serve you*

L. H. BREYFOGLE, Kalamazoo, Mich.
C. K. BEECHER, Delaware, Ohio
W. L. CAMPBELL, Savannah, Ga.
RALPH E. BRIGGS, Canton, Mass.
O. J. LELOFF, Vancouver, Wash.



TODAY a new pulpwood grinder is at work in American and Canadian mills, manufacturing greater groundwood tonnage of better quality at lower cost. It's the Roberts continuous, high-speed Grinder. It takes less power input per ton of pulp, saves on labor up to 70%, saves 50% in tailings. It feeds the wood continuously, there is no 'down time'. It has greater operating convenience, high efficiency, low upkeep, accurate control. Here is a more profitable way for you to manufacture your groundwood.



Look at the simple construction of the new Roberts Grinder. Note the continuous feed and the larger active grinding area. This high-speed machine manufactures 25 to 50 tons of groundwood a day. It replaces 3 or 4 pocket grinders yet takes little more space than one 3 pocket grinder, requires only slight mill change for installation. No auxiliary equipment is needed. Let us explain fully the many features of the Roberts Grinder.

THE APPLETON MACHINE COMPANY
· APPLETON · WIS ·

In Canada, F. W. ROBERTS MANUFACTURING COMPANY OF CANADA, Limited, Niagara Falls, Ont.

New TAPPI Members

The executive committee of the Technical Association of the Pulp and Paper Industry has elected the following to membership:

Rex Bradt, coating consultant, Michigan Carton Company, Battle Creek, Mich., graduated from Indiana University and formerly with the Fox River Paper Corporation, Appleton, Wis.

Bruce F. Brown, Jr., assistant chemist, Fibreboard Products Inc., Los Angeles, Cal., a 1937 graduate of Stanford University.

Kenneth E. Burgess, technical research director, Magnetic Pigment Company, a 1913 graduate of Toronto University and formerly with the Van Schaack Chemical Works, Chicago, Ill. and the Zapon Company, Stamford, Conn.

C. Wells Clark, chemist, St. Regis Paper Company, Deferiet, N. Y., a 1939 graduate of the New York State College of Forestry.

Russell M. Cooper, general superintendent, Powell River, B. C., attended McGill University and was formerly with the Consolidated Paper Company, Grand Mere, P. Q.

M. L. Downs, chief chemist, Thilmany Pulp and Paper Company, Kaukauna, Wis., has been transferred from the Associate to the Active grade.

Chauncey P. Foote Jr., chemist, American Bank Note Company, New York, N. Y., a 1934 graduate of Union College.

James L. Hayes, chief chemist and technical director, Bemis Bro. Bag Company, Peoria, Ill., has been transferred from the Associate to the Active grade.

L. W. Heard, superintendent, Ontonagon Fibre Corporation, Ontonagon, Mich., has been reinstated.

E. F. Machell, pulp tester, Pacific Mills Ltd., Ocean Falls, B. C., attended the University of British Columbia.

Frederick E. Macy, president, A. M. Collins Company, Philadelphia, Pa., attended McGill University and formerly with the Brown Company, the American Writing Paper Company, Dill & Collins Inc. and the Champion Paper and Fiber Company.

Owen D. Mosher, chemist, The Tanglefoot Company, Grand Rapids, Mich., a 1925 graduate of the University of Michigan and formerly with the Standard Oil Company, Grand Rapids, Mich.

L. D. Nicolson, secretary-treasurer and general manager, District of Columbia Paper Mills, Inc., a 1918 graduate of Stevens Institute of Technology.

Ernst Offenheimer, attended the University in Darmstadt and formerly director of the Cellulosefabrik Company, Okriftel, Germany.

Noel R. Phillips, research assistant, Southland Paper Mills Inc., Lufkin, Texas, a 1941 graduate of the New York State College of Forestry.

W. L. Schnorbach, engineer, Filer Fibre Company, Filer City, Mich., attended the University of Michigan.

Clarence L. Smith, assistant chief chemist, National Container Corporation, Jacksonville, Fla., a 1933 graduate of Vanderbilt University.

If you need

chlorine

BEWOID ROSIN definitely brightens paper, thereby compensating for chlorine deficiency.

SVEEN PROCESS improves opacity as well as brightness.

pigments

That ***SVEEN PROCESS*** can reduce pigment and filler consumption 25% is easily demonstrated with no interruption of production.

alum

30% to 60% reduction of alum by use of ***BEWOID ROSIN SIZE SYSTEM***—also 20% to 40% less rosin to maintain present sizing specifications. Alum reduction measurably improves life of wires and other equipment throughout the paper mill.

For Details Consult

BULKLEY, DUNTON PULP COMPANY
INCORPORATED
295 Madison Avenue New York, N.Y.

"If time is short—speed the stroke"— ancient words, thinly paraphrased to fit this moiling age in which strength and preparation for defense springs from the tools of the Engineer.

But speed comes to the stroke—whether of pen or pile driver—through the exercise of skills, ingenuity and direction which Time culminates into the vitalized experience of a balanced Engineering organization.

This kind of Engineering experience—seasoned and alert—is your best guarantee of speed for production *now* and adaptability to conversion in the future.

Buy Paper Under Walsh-Healey Act

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 24, 1941—For the week ended September 6, the government purchased $185,798.63 worth of paper under the Walsh-Healey act with the following orders:

$11,583 worth of ledger paper for GPO from Mudge Paper Company; $23,250 worth of paper cups for War Med. Brooklyn, from Boston Drinking Cup division of Boston Envelope Company; $12,462.50 worth of wrapping paper for War Med. Brooklyn, from L. Hyman & Sons; $27,450 worth of paper spit cups for War Med. Brooklyn, from Stone & Forsyth Company; $28,320 worth of spit cups for War Med. Brooklyn, from Burnitol Manufacturing Company; $15,415.13 worth of cardboard for War Med. Brooklyn, from Walker-Goulard Plehn Company; $44,708 worth of corrugated cartons for War Ord., from David Weber & Co.; $22,610 worth of fiber boxes for Treas. Proc. D. C., from Container Corporation of America.

Lumber Ruling Affects Pulp Mills

MONTREAL, Que., September 22, 1941—As many of the large pulp and paper industries in Canada are also large producers of lumber they are affected by three new orders issued by the federal Timber Controller setting maximum dealers' prices for various kinds of lumber and shingles. The orders establish maximum prices for:

1. Hard maple, basswood and soft elm, excluding swamp elm, sold anywhere in Canada;
2. White cedar shingles sold in Ontario, Northern Ontario, Quebec, New Brunswick and Nova Scotia districts and Prince Edward Island; and
3. Spruce lumber delivered at any place in New Brunswick or Nova Scotia.

The maximum prices are fixed at recent market levels and the orders are part of a program to prevent inflation.

Brotherhood To Represent Union Bag

HUDSON FALLS, N. Y., September 22, 1941—The employees of the bag division of the Union Bag and Paper Company held a meeting this week at which it was voted to have the International Brotherhood of Pulp, Sulphite and Paper Mill Workers represent them in collective bargaining. There were 716 ballots cast and 652 of the total voted for collective bargaining while 61 voted against such action. Victor A. Pascal, supervisor of the National Labor Relations Board, conducted the election. The bag division of the company was recently unionized and it is understood that other departments are also planning to take similar steps.

Davis Paper Co. Dedicates Warehouse

WEST HOPKINTON, N. H., September 22, 1941—The dedication of a recently completed warehouse here by the Davis Paper Company was a gala affair September 12, with a dance and entertainment, including a floor show and an orchestra, given for the employees by the company. Dancing on a cement floor, treated to facilitate gliding, lasted until 2 A.M. One thousand were present.

About 35 years ago, there was a similar dedication, when the Davis Paper Company removed the plant from Davisville to West Hopkinton.

New Power Dam

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—Contsruction of the new power dam on the Wisconsin River north of Stevens Point, Wis., near the village of Knowlton, by the Consolidated Water Power and Paper Company will create a lake nine miles long. It has been given the name of "DuBay" lake, honoring and perpetuating the name of John B. DuBay, who before Wisconsin became a state was a noted fur trader and interpreter for Henry Dodge, territorial governor, as early as 1836. DuBay built the first house constructed in Portage County, and operated his trading post at the "Great Bend" of the Wisconsin River near the site of the dam. A ferry for crossing was established there in 1857. DuBay was one of the first to recognize the beauties and possibilities of the Wisconsin River, and although he had visions of a great settlement, the establishment of paper mills and other industries at Wausau, Stevens point, Wisconsin Rapids and Port Edwards decreed otherwise.

The Wisconsin Public Service Commission has under consideration the company's application to construct the Consolidated's $2,000,000 dam and power plant, following a hearing conducted at Madison, Wis., September 19.

William F. Thiele, chief engineer of the Consolidated company at Wisconsin Rapids, testified that the project would cost $2,215,039, exclusive of the expense of relocating U. S. Highway 51. This figure, he said, includes the cost of power house, transmission lines, equipment, excavations and flowage lands. The estimate, he added, should be close to actual costs because the equipment already has been purchased. No one appeared against the application.

Mr. Thiele's estimate is that the structure will produce 43,000,000 kilowatt hours of energy per year, and that this would become a part of the company's general supply of power. All but 663 acres of the area to be flooded had been purchased, he said, and the acreage still to be obtained is held by 20 individuals.

Company officials have appealed to the federal OPM for favorable consideration on priorities for materials, due to the need of increased power supply on defense orders. Power produced by these facilities has been offered to the government if needed in the defense program.

For the MODERN BAG PLANT
½ Bbl. Combination for Valve and Satchel Bottom Bags 16" to 24" wide, 22" to 46" long.
Patented Photo-electric Side Register for guiding traveling web.
Intucked Multi-wall Tuber for Sewed Valve Bags.
One or two wall Side Seam Tuber with Cross Pasters and Side Register Control.
Heavy Duty Multi-wall Tuber, built in cross pasters and automatic compensator
Pressor Conveyor for Bottomers making multi-wall pasted bottoms.
Combination Bottomer for pasted bags 17½" to 28" wide, 22" to 60" long, 2½" to 9" wide bottoms.
500 Tubes per minute, double cut-off, center or side seam, right angle delivery
A full line of smaller sizes Tubers and Bottomers — Flat and Square Bag Machines. Also manufacturers of Paper Mill Machinery, Cylinder and Fourdrinier — Jordans — Pumps — Rotary Cutters — The Famous "UNDERCUT" Paper Trimmer.
1828
The SMITH & WINCHESTER Manufacturing Company
SOUTH WINDHAM
CONNECTICUT

Lake States Section Meets October 14

The Lake States section of the Technical Association of the Pulp and Paper Industry will hold its first meeting of the fall season Tuesday evening, October 14, at the Conway hotel, Appleton, Wis., according to William J. Plank, secretary. Among the speakers to appear during the year will be representatives of the United States Forest Products Laboratory, the Ansul Chemical Company, Hercules Powder Company, the Institute of Paper Chemistry, Weyerhaeuser Timber Company and Steinhall Manufacturing Company.

Superintendents To Meet October 10

Plans and arrangements are entirely completed for the Fall Meeting of the Northwest Division of the American Pulp & Paper Mills Superintendents' Association to be held in Green Bay, Wis., October 10-11.

The committee handling the affairs of this two day meeting, headed by General Chairman H. W. Sherman, includes the following: H. W. Sherman, general chairman; A. K. McNaughton, chairman of reservations; Don Fairbairn, chairman of publicity; Walter Johnson, chairman of program; Mrs. H. W. Sherman, chairman of ladies' program; John Maloney, Jr., chairman of arrangements; W. J. Clancy, chairman of entertainment; H. L. Nichols, chairman of golf; E. C. Jacobi, chairman of skeet; H. F. Bins, chairman of prizes; N. L. Malcove, chairman of finance committee, and Gus Klaus, chairman of mill visits.

John V. Zieman, general chairman of the Spring Meeting, at Marinette, is also cooperating with the Green Bay Meeting Committee in an advisory capacity.

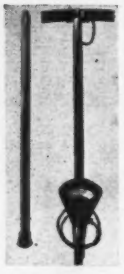
The business and entertainment program for the Green Bay Fall Meeting will be announced next week by the committee in charge. The general theme of this two day gathering will be, "College Home Coming Days." Meeting and entertainment rooms will be appropriately decorated for the occasion.

A golf tournament will be held Saturday, October 11, at the Oneida Golf and Riding Club. This is one of the famous golf layouts of the Northwest section, and everyone interested in this sport should be sure to test their skill out on this famous course.

Headquarters during the Fall Meeting will be at the Northland Hotel. Reservations can be forwarded at once to either the Northland or Beaumont Hotels, Green Bay, Wis.

PROPER DRYING ROLL TEMPERATURE IS A BIG AID TO QUALITY!

A Cambridge Pyrometer is ideal for checking surface temperatures of drying rolls. This handy, accurate instrument will help you to eliminate curling, cockling, breaking, brittleness and many other paper troubles.



Proper roll temperatures permit steam economy . . . increased production . . . better paper. Write for complete details of the Cambridge Pyrometer.

The Cambridge is made with an extension attachment to reach otherwise inaccessible rolls.

CAMBRIDGE INSTRUMENT CO., INC.
3732 Grand Central Terminal, New York City

CAMBRIDGE SURFACE PYROMETERS

Send for descriptive literature. The use of these instruments will help you make better paper.

Bids for Government Paper

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 24, 1941—Government Printing Office has received the following bids for 231,000 pounds of 38 x 48 white offset book paper; R. P. Andrews Paper Company, 8.48 cents (for 80,000 pounds only); Mudge Paper Company, 9.4 cents; and Paper Corporation of U. S., 8.88 cents.

For 172,000 pounds of 50% rag, 21 x 32 white bond paper: Resolute Paper Products Corporation, 17.32 and 18.37 cents less 2%; R. P. Andrews Paper Company, 15.15 and 15.5 cents; Walker Goulard Plehn Company, 15.35 cents; Barton, Duer & Koch Paper Company, 15.5 cents; and Cauthorne Paper Company, 15.4 cents (for 86,000 pounds only).

For 1,650 sheets of 22 x 28 buff railroad board; Chicago Cardboard Company, $75.20 per M sheets; Mathers-Lamm Paper Company, $83.50; Barton, Duer & Koch Paper Company, $74.50; R. P. Andrews Paper Company, $69.73; and Mudge Paper Company, $77.95.

For 161,700 pounds of 32 x 52: Mudge Paper Company, 9.4 cents; R. P. Andrews Paper Company, 8.3 cents; Paper Corporation of U. S., 9.8 cents; Bulkley Dunton & Co., 9.45 cents; Stanford Paper Company, 8.58 cents; and Butler Company, 8.034 cents (for 80,850 pounds only).

For 44,400 pounds of 32½ x 42½ pink mimeograph paper: Cauthorne Paper Company, 8.6 cents; Eastern Corporation, 8 cents and Paper Corporation of U. S., 9.5 cents.

For 40,750 pounds of 28 x 34, 25% rag, blue bond paper: Old Dominion Paper Company, 14.148 cents; Mudge Paper Company, 14.25 cents; and Whiting Paper Company, 14.25 cents.

Paper Firms Get Defense Contracts

[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., September 22, 1941—Among the contracts announced by the OPM Office in this city September 16 as awarded by the War Department September 15 was one to Frank Brothers Paper Company, Inc., Springfield, Mass., for cases, towels and paper, $3,420.

Additional contracts awarded on September 10 included one to the New England Container Company, Chicopee, Mass., for cartons for cartridge clips $3,540.60 and one to the Burnitol Manufacturing Company, Boston, for cuspidors and cardboard, $3,012.50.

Paper Firms Exhibit at Springfield

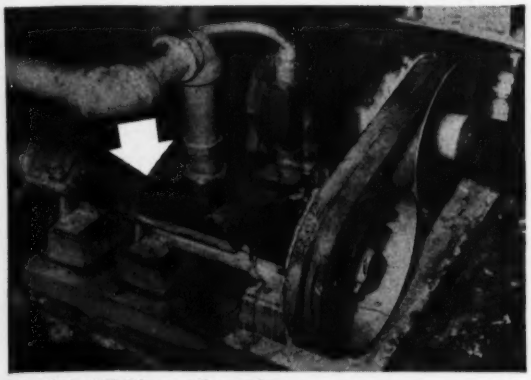
[FROM OUR REGULAR CORRESPONDENT]

BOSTON, Mass., September 22, 1941—Among the paper manufacturers exhibiting at the Eastern States Exposition, Springfield, Mass., last week, was the Tileston & Hollingsworth Company. Paper-making by hand was demonstrated and a two-color house, made entirely of Tru-Colours and Cover and Text Papers was shown.

Among other exhibits was that of the Parker-Young Company.

No Pumping Job too Tough—

FOR THE R & M MOYNO

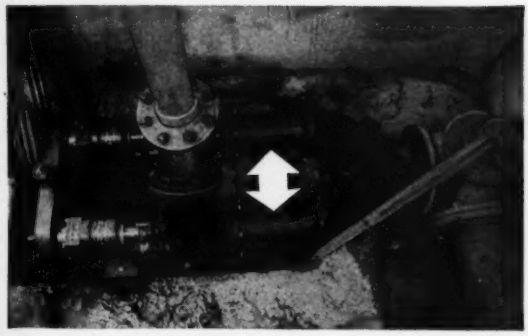


Recently installed in new Texas plant.

Under grueling working conditions . . . in leading paper mills everywhere, R & M Moyno pumps are performing difficult pumping jobs . . . giving trouble-free service . . . reducing costs . . . improving finished product quality.

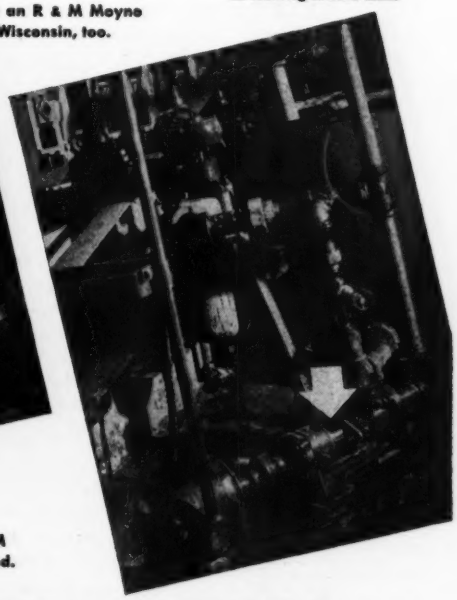
The R & M Moyno is the proved, profitable answer to *your* pumping problems. It is valveless, self priming, positive in displacement . . . handles coating solutions up to 53% solids, delivering a uniform discharge at constant pressure without agitation or cavitation.

Investigate the R & M Moyno pump today. An R & M field expert will analyze your pumping problems without obligation . . . and may help you save thousands of dollars. Write now for R & M Pump Folder No. 1777.



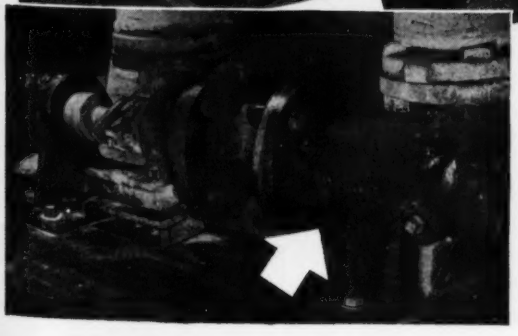
Doing double duty in an Ohio mill.

Saving time and money in leading Maine mill.



It's an R & M Moyno in Wisconsin, too.

Installation in a New Hampshire mill.



Another satisfied R & M Moyno user in Maryland.

ROBBINS & MYERS, Inc.

MOYNO PUMP DIVISION SPRINGFIELD, OHIO

HOISTS • CRANES • MOTORS • FANS • FOUNDED 1878

PAPER
TRADE JOURNAL
Title Reg. U. S. Pat. Off.
Henry J. Berger
EDITOR

Vol. 113 September 25, 1941 No. 13

COMING EVENTS IN PAPER INDUSTRY

NEW ENGLAND SECTION. Technical Association of the Pulp and Paper Industry—Third Friday of each month at the Roger Smith Hotel, Holyoke, Mass.

DELAWARE VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Friday of each month at the Engineers Club, Philadelphia, Pa.

LAKE STATES SECTION. Technical Association of the Pulp and Paper Industry—Second Tuesday of each month at the Conway Hotel, Appleton, Wis.

KALAMAZOO VALLEY SECTION. Technical Association of the Pulp and Paper Industry—First Thursday of each month at the Park, American Hotel, Kalamazoo, Mich.

THE NEW TAX BILL

The new tax bill is notable for the levying of the highest tax rate in the country's history and it is intended to raise $3,553,400,000 as part payment for the country's armament and lend-lease projects. As had been predicted and expected, this latest revenue bill may be characterized as a hodgepodge measure, filled with numerous inequities which Congress will attempt to remedy. Like all of its recent predecessors, this new revenue act has been too hastily considered and drawn to adequately meet the need. As the estimated revenues fall well below the recommendations of Secretary Morgenthau, for financing two-thirds of the governments expenditures from taxes, and one-third by borrowing, another tax bill is now expected to be introduced early in 1942.

In a clear analysis of the excess profits provision in the new measure, Godfrey N. Nelson, tax authority, in an article in *The New York Times* states in part that, "Not in itself a complete revenue measure, this is the second bill to be enacted this year containing amendments to the Excess Profits Tax of 1940; the first, designated 'Excess Profits Tax Amendments of 1941,' was signed by the President on March 7. Hardly had the new bill left the Joint Congressional Conference when it was announced at Washington that work is about to start on a new revenue bill, the object of which will be to revise administrative provisions with a view to stopping loopholes in present tax laws. This prospect augurs not well for a continuance of equitable tax principles. Heretofore such discussions have almost invariably preceded legislation by which the relation between true income and taxable income has been distorted."

In explaining that the deduction system stand unaltered, Mr. Nelson, points out that "The reversal in the deduction for the corporation normal tax in calculating the amount subject to excess profits tax . . . remains unchanged. Thus, neither the normal tax nor the surtax is allowed as a deduction in computing the excess profits net income of the taxable year. This applies also to the base period years, so that the credit for base period net income is increased accordingly. The amount of the excess profits tax, however, is deductible in computing the net income subject to the corporate normal tax and surtax. Although the new excess profits tax amendments are applicable only in respect to taxable years beginning after December 31, 1940, the fact that the normal tax is not deductible in computing the excess profits tax net income gives rise to a change in the base period net income in calculating the amount of the unused excess profits credit carry-over."

Continuing, Mr. Godfrey says in part: "In this connection the new amendment provides: 'For such purpose the excess profits credit and the excess profits net income for any taxable year beginning in 1940 shall be computed under the law applicable to taxable years beginning in 1941.' (Section 202(e) of 1941 Act, amending Section 710(c)(2) of Internal Revenue Code, added March, 1941). The House bill contained a provision for a special tax of 10% of the excess of the adjusted excess profits net income computed under the income credit over the adjusted excess profits net income computed under the invested capital credit. The purpose of the proposal was to reach profits which, though substantially in excess of those of the base period, escaped the excess profits tax by reason of the allowance of credit based on invested capital. Believing that the 10% tax to be inconsistent with Congressional policies, the Senate eliminated the provision and substituted ten-point increases in the graduated rates as follows: Not over $20,000, 35%; over $20,000 to $50,000, 40%; over $50,000 to $100,000, 45%; over $100,000 to $250,000, 50%; over $250,000 to $500,000, 55%, and over $500,000, 60%. The excess profits credits, based on invested capital, are as follows: Not over $5,000,000, 8%; over $5,000,000, 7%."

In commenting on other provisions, Mr. Nelson expressed the opinion that "Consolidated return provisions, limited except as to railroads to the excess-profits tax, which were added to the law by the second 1940 Revenue Act, remain unchanged by the new bill. Under section 730 of the Internal Revenue Code affiliated groups of corporations, as defined therein, have the privilege of making consolidated excess-profit tax returns in lieu of separate returns. At least 95% of each class of the stock of each of the includible corporations (except the common parent corporation) must be owned by one or more of the other includible corporations and the common parent corporation must own directly at least 95% of each class of the stock of at least one of the other includible corporations."

The new tax bill should create a more widespread tax consciousness, since it affects some 22,000,000 persons, with approximately 4,900,000 filing their first tax returns. From estimate by the Treasury, it appears that $1,144,600,000 will be paid by individuals, $1,382,100,000 from corporations, $179,900,000 from capital stock, estate and gift taxes, and $846,-800,000 from excise and miscellaneous levies. The excise taxes will become effective on October 1. The supplemental tax bill, now excepted to be discussed by the Senate sometime in November, will probably include the mandatory joint proposal, a plan to overrule the community property laws in eight States, and a proposal to tax certain large mutual insurance companies.

Wausau To Resume Operations

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., September 22, 1941—Using an emergency power hookup, the pulp mill of the Wausau Paper Mills Company, Brokaw, Wis., was scheduled to go back into production today, according to announcement of Harold C. Collins, president. The mill, which escaped flood damage when the company's generator plant was wrecked and the paper mill partially destroyed, has been idle since the Wisconsin River went on a rampage during the Labor Day weekend following excessive rains.

Plans are still indefinite for rebuilding the power dam, generating plant and the finishing room, Mr. Collins said, but means of restoring the paper mill production are under study.

Production Ratio Report*

(Production as per cent of six-day capacity)

COMPARATIVE WEEKLY SUMMARIES

Current Weeks, 1941		Corresponding Weeks, 1940	
August 9	101.5	August 10	87.9
August 16	101.1	August 17	84.6
August 23	102.8	August 24	84.7
August 30	101.9	August 31	83.4
September 6 (Holiday Week)	86.1	September 7	69.3
September 13 (Prelim.)	*104.0*	September 14	85.2

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July
1940	89.1	84.7	82.3	84.3	90.0	92.1	85.3
1941	85.6	89.7	92.2	96.4	98.9	99.5	94.8

Year	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1940	85.1	81.5	85.5	84.9	80.9	85.6
1941	*101.9*	...	...	...	...	...

COMPARATIVE YEARLY SUMMARIES

	1935	1936	1937	1938	1939	1940	1941
Year to Date	68.5	78.1	86.3	69.1	79.1	86.2	*94.6*
Year Average	69.9	80.4	79.8	71.5	83.4	85.6	...

* Based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily availble. Does not include mills producing newsprint exclusively.

PAPERBOARD OPERATING RATIOS †

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1936	62	67	67	70	69	70	69	75	78	82	80	74	72
1937	80	86	86	88	85	77	66	74	69	65	55	45	73
1938	54	60	61	57	58	56	57	66	66	70	65	59	61
1939	60	67	71	69	64	67	63	72	74	84	81	71	70
1940	71	70	69	70	76	79	72	74	72	79	77	71	73
1941	75	81	82	83	84	88	86	*94*	..	..	..	..	..

Week ending Aug. 9, 1941—91
Week ending Aug. 16, 1941—92
Week ending Aug. 23, 1941—94
Week ending Aug. 30, 1941—97
Week ending Sept. 6, 1941—80
Week ending Sept. 13, 1941—*98*

† Per cents of operation based on "Inch-Hours" reported to the National Paperboard Assn.

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"MI-MI-MI-MI-MI-MI-MI-MI!"

...screamed the soprano on page 128 to the outfielder on page 127

"How about ME?" roared the outfielder. "You made me miss that fly ball, you . . . hyena!"

"HYENA!" screamed the soprano. "He calls me a hyena! I who have seeng at ze Metropolitan . . . La Scala . . ."

"O.K., sister," sighed the fielder. "Forget what I said. But please take your mi-mi's somewheres else."

"Eef I could leave I would go," said the soprano. "But I am *ze show-through!* Only Krebs Peegments keep me on ze right side of ze page."

"Krebs Pigments will strike you out?"

"*Certainment! Zey* take *show-through* out ze theenest papair. And zey make papair so white zat preenting stands out sharp and clear—like my seenging. MI-MI-MI-MI . . .!"

"Now look, lady," interrupted the fielder. "That yodeling ain't helping my fielding any!"

"Eef you need help, ze Krebs experts feex technical peegment problems *beaucoup* eezy!

"I sure do need help," agreed the fielder. "Tell me what to do."

"Write ze letter—*tout de suite!*"

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Section of the
Technical Association of the Pulp and Paper Industry

Edited by Ronald G. Macdonald, Secretary

Hollocellulose Research in Cooperation with the Technical Association of the Pulp and Paper Industry*

By George J. Hajny[1] and George J. Ritter[2]

Abstract

A practical method for the determination of holocellulose[3] was developed. It was applied to nine woods. A method was also developed for converting the holocellulose by a dilute acid hydrolysis to a cellulose fraction closely approximating Cross and Bevan cellulose in yield.

The chemical composition of the holocellulose, the hydrolyzed holocellulose, and the Cross and Bevan cellulose from six pulpwoods were determined. Hydrolyzed holocellulose and Cross and Bevan cellulose are similar in composition and yields. Holocellulose differs from the other two cellulose fractions in that it is composed of the cellulose and the hemicellulose in the wood, contains all the acetyl groups and from 10 to 15% of the methoxyls in the wood. Holocellulose contains from 47 to 52% of alpha-cellulose by weight on the basis of the wood.

The relative states of degradation of holocellulose, hydrolyzed holocellulose, and Cross and Bevan cellulose were found by a determination of their viscosities when dispersed in cuprammonium solution. Holocellulose was the least degraded, Cross and Bevan cellulose was degraded more than the holocellulose, and the hydrolyzed holocellulose was degraded the most. The alpha-cellulose recovered from the holocellulose had higher viscosities than did the alpha-cellulose from the other two wood fractions.

A pulp appearing to have excellent properties for white paper was made by extracting white spruce holocellulose by means of dilute alkali. The residual bleached pulp so obtained constituted 58% of the wood. Strength properties of test sheets made from samples of the pulp at different beating intervals indicated the pulp to be comparable with sulphite pulp suitable for the manufacture of white bond papers.

Semichemical pulps appear to be suitable for the production of refined pulps in yields of 57 to 60% of the wood. An economical procedure for converting semichemical pulps to refined pulps in high yields seems feasible.

A high-alpha pulp constituting 49% of the wood and having an alpha-cellulose content of 98.7% was prepared from a refined aspen semichemical pulp. The high-alpha pulp was found to acetylate readily.

Research on holocellulose has been conducted at the Forest Products Laboratory during the last 5 years in cooperation with the Technical Association of the Pulp and Paper Industry (TAPPI). Under the cooperative agreement the Technical Association has contributed yearly financial grants for the employment, on a half-time basis, of a graduate student from the University of Wisconsin. The financial grants were increased for the last 2 years $400 and $600, respectively, as partial reimbursement to this Laboratory for expenses in connection with the research. The grants were obtained through recommendations from the TAPPI Fibrous Materials Testing Committee for the first 2 years and through recommendations from the TAPPI Fundamental Research Committee for the remaining 3 years of the cooperation. This report covers the accomplishments of the research up to date.

The types of experimental work conducted under the cooperative agreement are indicated by five main headings appearing in the body of this report. Since the results of the first 4 years have been published, they will be discussed briefly, whereas those of the current year will be discussed more fully.

1. Rapid Methods for the Determination of Holocellulose and Hydrolyzed Holocellulose

Work during the first year of cooperation was confined to the development of an improved method for the determination of holocellulose and for hydrolyzed holocellulose which is comparable to Cross and Bevan cellulose. The time required for the holocellulose

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[2] Senior Chemist, Forest Products Laboratory,[4] Forest Service, U. S. Department of Agriculture.

[3] Hollocellulose as employed in this report is composed of the hemicellulose and the cellulose in wood.

[4] Maintained at Madison, Wis., in cooperation with the University of Wisconsin.

determination by the improved method is about 2.5 hours as compared with 2.5 days by the method used previously *(2)*. Reduction in the time required for the determination is attributed to the technique employed for chlorinating the wood sample and to the use of alcohol-monoethanolamine for the extraction of the chlorinated lignin. The method has been published in the *Paper Trade Journal* and *Technical Association Papers (1)*.

The improved method for the holocellulose determination was applied to sawdust from white spruce, red spruce, jack pine, balsam fir, eastern hemlock, aspen, white oak, maple, and willow. Its accuracy, which is well within 1.0% of the theoretical value, may be seen from an examination of Table I in which are recorded the holocellulose and the lignin values of the nine preceding woods which were previously freed of materials other than holocellulose and lignin.

The method for the preparing of hydrolyzed holocellulose which is comparable to Cross and Bevan cellulose, involves the hydrolysis of holocellulose for 2 hours with 1.3% sulphuric acid at the temperature of the boiling water bath. A comparison of the values for the two cellulose materials from the preceding nine woods shows good agreement in Table II. The method has also been published *(1)*.

TABLE I.—RESULTS INDICATING THE ACCURACY OF THE HOLOCELLULOSE DETERMINATION

Results based on moisture-free (105 deg. C.) weight of the extractive-free wood.

Wood	Holocellulose by new method (1)	Lignin by sulphuric acid method (2)	Holocellulose and lignin (Col. 1 + 2) (3)
	%	%	%
White spruce	73.3	26.6	99.9
Red spruce	72.9	26.6	99.5
Jack pine	72.5	27.2	99.7
Balsam fir	69.9	30.1	100.0
Eastern hemlock	68.5	31.5	100.0
Aspen	82.5	17.3	99.8
White oak	75.4	24.1	99.5
Maple	76.3	23.5	99.8
Willow	78.3	22.0	100.3

TABLE II.—RESULTS INDICATING THE ACCURACY OF THE METHOD FOR CONVERTING HOLOCELLULOSE TO A CELLULOSE FRACTION COMPARABLE IN YIELD TO CROSS AND BEVAN CELLULOSE

Results based on moisture-free (105 deg. C.) weight of extractive-free wood).

Wood	Cross and Bevan cellulose: By hydrolysis of holocellulose	Cross and Bevan cellulose: By Cross and Bevan method (7) applied on wood
	%	%
White spruce	61.0	61.2
Red spruce	60.5	60.3
Jack pine	59.1	58.3
Balsam fir	55.3	56.4
Eastern hemlock	55.4	56.0
Aspen	63.7	64.1
White oak	60.2	59.6
Maple	57.9	57.9
Willow	61.5	61.5

2. Composition of Holocellulose, Hydrolyzed Holocellulose, and Cross and Bevan Cellulose *(2)*

During the second year of cooperation the composition of the holocellulose, hydrolyzed holocellulose, and Cross and Bevan cellulose was determined for comparison. The three cellulose materials were prepared from aspen, balsam fir, eastern hemlock, jack pine, red spruce, and white spruce. They were then analyzed according to the methods described in the citations for each of the following constituents and substituent groups: alpha-cellulose *(4)*, pentosans *(5)*, uronic acid *(6)*, acetyl *(7)*, methoxyl *(8)*. The holocellulose and Cross and Bevan cellulose were also analyzed for lignin *(9)* although none was found.

Data obtained by the preceding analyses of the three cellulose materials are recorded in Table III. It may be noted that the holocellulose has a lower alpha-cellulose content than has the other two cellulose materials. Conversely, its pentosan, uronic acid, acetyl, and methoxyl values are greater than those of the other two materials from the corresponding woods.

Table IV shows that, on the basis of the wood, the alpha-cellulose content of holocellulose is greater than that of the other two materials. And, further, on the same basis, holocellulose contains from 8.0 to 13.4% more alpha-cellulose than do the commercial pulps. These data suggest the possibility of developing pulping procedures for retaining in the pulp increased amounts of the alpha-cellulose present in the wood and thereby increase the pulp yields.

TABLE IV.—ALPHA-CELLULOSE CONTENT OF CELLULOSE FRACTIONS

Percentages expressed on weight of moisture-free (105 deg. C.) extractive-free wood.

Species (1)	Holocellulose (2)	Cross and Bevan cellulose (3)	Hydrolyzed holocellulose (4)	Pulp (5)
	%	%	%	%
Aspen	50.7	48.3	47.3	42.3 (bleached soda)
Balsam fir	44.0	39.8	39.3	...
Eastern hemlock	48.2	43.2	41.7	34.8 (sulphite)
Jack pine	49.5	43.2	43.1	36.1 (sulphate)
Red spruce	48.3	43.4	43.3	...
White spruce	49.5	44.6	43.7	39.8 (bleached sulphite)

TABLE III.—RESULTS OF ANALYSES OF HOLOCELLULOSE, HYDROLYZED HOLOCELLULOSE, AND CROSS AND BEVAN CELLULOSE

Material (1)	Basis moisture-free wood, yield (2)	Results based on moisture-free (105 deg. C.) material: Alpha cellulose (3)	Pentosan Tollen's method (4)	Uronic acid anhydride ($CO_2 \times 4$) (5)	Acetyl (6)	Methoxyl (7)
	%	%	%	%	%	%
Aspen holocellulose	82.5	61.4	28.2	5.04	5.53	1.13
Hydrolyzed holocellulose	63.7	74.3	15.9	2.60	3.07	.70
Cross and Bevan cellulose	64.1	76.3	19.9	2.64	1.61	.52
Balsam fir holocellulose	69.9	63.0	10.3	4.28	3.18	.58
Hydrolyzed holocellulose	55.3	70.9	7.1	1.96	2.06	.53
Cross and Bevan cellulose	56.4	70.7	6.0	1.92	1.40	.54
Eastern hemlock holocellulose	68.5	70.4	8.9	4.88	2.70	1.23
Hydrolyzed holocellulose	55.4	75.2	5.5	1.92	1.76	.48
Cross and Bevan cellulose	56.0	77.1	4.6	1.88	1.94	.33
Jack pine holocellulose	72.5	68.3	15.0	4.00	2.68	1.04
Hydrolyzed holocellulose	59.1	73.0	8.8	1.84	1.60	.69
Cross and Bevan cellulose	58.3	74.1	6.8	1.88	1.76	.73
Red spruce holocellulose	72.9	66.2	13.0	4.36	3.21	1.25
Hydrolyzed holocellulose	60.5	71.6	7.6	2.00	1.40	.49
Cross and Bevan cellulose	60.3	72.0	6.7	2.04	1.51	.42
White spruce holocellulose	73.3	67.5	12.2	3.64	3.19	.96
Hydrolyzed holocellulose	61.0	71.7	6.9	1.84	1.59	.45
Cross and Bevan cellulose	61.2	72.9	6.2	1.92	1.61	.43

3. Yield and Viscosity of Holocellulose and Some of Its Cellulose Fractions *(10)*

The fact that the holocellulose contains, on the basis of the wood, more alpha-cellulose than does hydrolyzed holocellulose or Cross and Bevan cellulose can be explained on the basis that the holocellulose had undergone less degradation than the other two cellulosic materials. In order to test the soundness of this explanation, viscosity measurements in cuprammonium solution *(11)* were made on each of the three materials and also on their alpha-celluloses. The relative viscosity so obtained is a rough measure of the relative degree to which the cellulose chains have been shortened in the cellulosic materials by degrading agents.

Viscosity data of the six celluloses from the woods employed under the preceding heading are listed in Table V. It is shown in Table V that the viscosity of the holocellulose is greater than that of the Cross and Bevan cellulose or that of the hydrolyzed holocellulose. Further, the viscosity of the alpha-cellulose from holocellulose is higher than that of the alpha-celluloses from the other two cellulosic materials. The preceding data indicated that holocellulose and its alpha-cellulose are less degraded than the other corresponding materials. Hydrolyzed holocellulose and its alpha-cellulose have lower viscosities than Cross and Bevan cellulose and its alpha-cellulose which is undoubtedly due to the acid treatment employed in the preparation of the hydrolyzed material.

4. Conversion of Holocellulose to Pulp Suitable for White Paper *(12)*

Experiments during the fourth year of the cooperative research were directed to the preparation of pulps from white spruce Asplund fiber,[5] and to the properties of the pulps and of the test sheets made from the pulps.

Isolation of Holocellulose for Pulp

Holocellulose was prepared in 1-pound batches according to the procedure of Van Beckum and Ritter *(1)* from white spruce Asplund fiber. It constituted 68% of the fiber, had an alpha-cellulose content of 52% on the basis of the fiber, and a viscosity in cuprammonium solution *(11)* of 40.4 centipoises.

Conversion of Holocellulose to Pulp

A pulp consisting of 59.4% of the Asplund fiber was prepared by extracting the holocellulose with 5% sodium hydroxide solution at the temperature of the boiling-water bath for 2 hours. It is designated in Table VI as unbleached pulp from holocellulose.

A portion of the unbleached pulp was bleached to 87 parts blue (Ives) by means of 0.5% bleaching powder having 35% available chlorine. This pulp is designated in Table VI as bleached pulp from holocellulose. It is 58.1% of the Asplund fiber, has a viscosity of 37.4 centipoises, and contains 52% of alpha-cellulose on the basis of the Asplund fiber.

[5] The white spruce Asplund fiber was kindly furnished by the Wood Conversion Company of Cloquet, Minn.

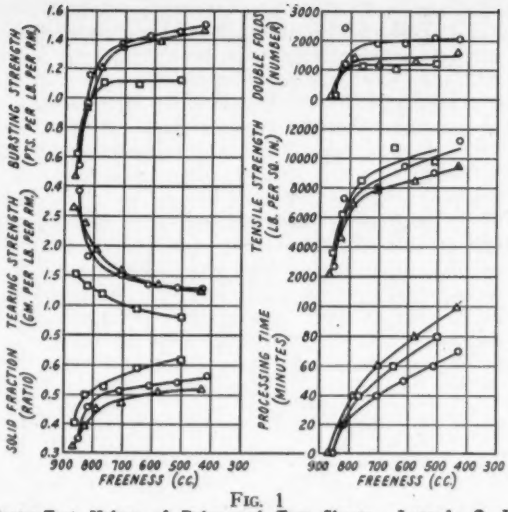
BURSTING STRENGTH (PTS. PER LB. PER RM.)
TEARING STRENGTH (GM. PER LB. PER RM.)
SOLID FRACTION (RATIO)
DOUBLE FOLDS (NUMBER)
TENSILE STRENGTH (LB. PER SQ. IN.)
PROCESSING TIME (MINUTES)
FREENESS (CC.)
FREENESS (CC.)

FIG. 1

Beater-Test Values of Pulps and Test Sheets. Legend: O—Unbleached Pulp from Holocellulose. Δ—Bleached Pulp from Holocellulose. □—Spruce Sulphite Pulp.

Physical Properties of Pulps and Test Sheets

The physical properties of the two pulps and of test sheets made from them after various periods of treatment in a 1.5-pound beater were determined by TAPPI standard methods. Results of the tests are shown in Fig. 1 in which the freeness of the two pulps and also of a bleached sulphite pulp are plotted against the physical properties of the test sheets. The graphs indicate that in most instances the test sheets made from the holocellulose are superior to those made from the bleached sulphite pulp which is only 43.0% of the wood.

5. A Procedure for the Preparation of Refined Pulps in High Yields

In the 4 preceding years' work described in this report the amount of chemical and the conditions employed for the preparation of holocellulose approximated those prescribed for the quantitative determination of the material. The cost of producing a cellulose material under these conditions for conversion

TABLE VI.—YIELD AND VISCOSITY OF CELLULOSIC MATERIALS FROM WHITE SPRUCE

Percentage yield based on weight of moisture-freed wood; viscosities expressed in centipoises in cuprammonium solution.

	Holocellulose and pulps		Alpha-cellulose	
Cellulosic materials	Yield	Viscosity	Yield	Viscosity
(1) Holocellulose (prepared in 1-pound batches) and its alpha-cellulose	68.0	40.4	52.0	48.8
(2) Unbleached pulp (prepared from (1)) and its alpha-cellulose	59.4	41.9	52.4	47.3
(3) Bleached pulp (prepared from (2)) and its alpha-cellulose	58.1	37.4	52.0	43.2

TABLE V.—YIELD AND VISCOSITY OF CELLULOSIC MATERIALS FROM VARIOUS WOODS

Percentage yield based on weight of moisture-freed wood; viscosities expressed in centipoises in cuprammonium solution.

	Aspen		White spruce		Red spruce		Jack pine		Balsam fir		Eastern hemlock	
Cellulosic materials	Yield	Viscosity	Yield	Viscosity	Yield	Viscosity	Yield	Viscosity	Yield	Viscosity	Yield	Viscosity
Holocellulose	82.5	40.2	73.3	32.7	72.9	35.4	72.5	50.1	69.9	20.1	68.5	23.0
Cross and Bevan cellulose	64.1	28.9	61.2	17.2	60.3	18.8	58.3	26.9	56.4	19.7	56.0	20.3
Hydrolyzed holocellulose	63.7	11.2	61.0	13.7	60.5	11.6	59.1	15.8	55.3	6.4	55.4	8.5
Alpha from holocellulose	50.7	72.3	49.5	68.2	48.3	56.7	49.5	77.7	44.0	39.2	48.2	36.1
Alpha from Cross and Bevan cellulose	48.3	39.6	44.6	23.8	43.4	30.1	43.2	29.2	39.8	24.0	43.2	23.5
Alpha from hydrolyzed holocellulose	47.3	18.0	43.7	21.1	43.3	18.4	43.1	21.1	39.3	19.3	41.7	20.9

to pulps suitable for white papers or to high-alpha pulps suitable for cellulose derivatives is higher than that for producing bleached sulphite pulp; therefore the development of a more economical procedure for the production of refined pulps in high yields was undertaken.

Some preliminary work was done during the year of 1939-40 on semichemical pulp as a source for refined pulps in high yields. When the moist semichemical pulp was treated with gaseous chlorine, followed by an extraction with alcohol-monoethanolamine the refined pulp yield was approximately 65% of the wood. When the semichemical pulp was treated with chlorine water, followed by an extraction with aqueous 2% sodium sulphite solution the refined pulp yield was approximately 60% of the wood.

Semichemical pulps were prepared as sources for the refined pulps from aspen, shortleaf pine, and white spruce by the Division of Pulp and Paper of this Laboratory. Their yields and lignin content are given in Table VII. Experiments were made to determine the amount of chemical necessary for refining these semichemical pulps.

TABLE VII.—YIELD AND LIGNIN CONTENT OF SEMICHEMICAL PULPS

Semichemical pulp	Yield on basis of wood, %	Lignin content on basis of pulp, %
Aspen	73.0	13.1
Shortleaf pine	81.5	16.6
White spruce	80.0	21.2

Chlorine Requirement

The weight of chlorine taken up when wood is suspended in chlorine water is approximately 1 1/3 times the weight of the lignin in the wood. A ton of aspen semichemical pulp having a lignin content of 13.1% would contain 262 pounds of lignin. The chlorine requirement for chlorination would be 349 pounds ($262 \times 1\ 1/3 = 349$). At 2 cents a pound the cost of chlorine would be $6.98.

Chemical-base Requirement

The chemical-base requirement for removing the chlorinated lignin from the semichemical pulp was considered on the basis of concentration of base in the liquor and ratio of liquor to the chlorinated semichemical pulp.

Chemicals used for dissolving the chlorinated lignin in the Cross and Bevan method for cellulose is at least five times the weight of the wood sample. It was found in the present study that satisfactory results could be obtained when the amount of chemical was reduced to 10% of the weight of the lignin in the semichemical pulp sample. Thus a ton of aspen semichemical having 13.1% lignin would contain 262 pounds of lignin. It would require 26.2 pounds of chemical base, such as sodium sulphite or sodium hydroxide, for the removal of the chlorinated lignin. At 2 cents a pound the chemical base would cost 53 cents.

The ratio of lignin chloride solvent to the semichemical pulp was reduced from 50:1 to 12:1. Semichemical pulps, properly chlorinated, which can be done in one step, and extracted according to the procedure described below, can easily be bleached to an acceptable whiteness by means of calcium hypochlorite.

Hypochlorite Requirement

Approximately 1% of available chlorine applied in the form of calcium hypochlorite is required to produce the desired whiteness. This would require about 60 pounds of bleaching powder containing 35% of available chlorine per ton of pulp. At 2 cents a pound the bleach powder would cost $1.20.

Procedure for Refining Semichemical Pulp

The semichemical pulp was suspended at approximately 3% consistency in chlorine water while being stirred at room temperature. When the pulp had turned to a pinkish yellow color it was drained on a screen and washed free of chlorine water. During constant stirring the washed chlorinated pulp was extracted at 80 deg. C. for about 40 minutes with approximately 12 parts by weight of an aqueous solution of sodium hydroxide or sodium sulphite solution or with 12 parts of an alcohol-monoethanolamine solution to 1 part of pulp. The amount of base in either the aqueous or the alcoholic solution was equivalent to approximately 10% of the weight of the lignin in the pulp sample. The extracted pulp was then drained on a screen and washed with water until neutral. It was then bleached with approximately 1% of available chlorine applied in the form of calcium hypochlorite and washed.

The cost of refining a semichemical pulp according to the preceding procedure will depend largely upon its lignin content. An estimation of the cost of preparing a ton of refined aspen pulp, such as listed in Column 2, Table VIII, may be computed as follows: the aspen semichemical pulp contains 13.1% lignin and the refined pulp yield is 83.5%; therefore, approximately 2400 pounds of semichemical pulp are required per ton of refined pulp. This amount of

TABLE VIII.—YIELDS AND PROPERTIES OF REFINED PULPS PREPARED FROM SEMICHEMICAL PULPS

	Treatment for producing refined pulp from semichemical pulp from—					
	Aspen	Shortleaf pine	White spruce			
Material (1)	Two chlorinations plus two sulphite extractions (2)	Two chlorinations plus two sulphite extractions (3)	Two chlorinations plus two alcoholic ethanolamine extractions (4)	Two chlorinations plus two sulphite extractions (5)	Two chlorinations plus two aqueous NaOH extractions (6)	One chlorination plus one aqueous NaOH extraction (7)
Refined pulp (percentage)						
of semichemical pulp	63.5	72.9	78.8	77.5	76.8	76.0
of wood	61.0	59.5	63.0	62.0	61.4	60.8
Alpha-cellulose (percentage)						
of refined pulp	79.2	78.0	82.8	82.0	82.7	82.9
of wood	48.3	46.4	52.1	51.0	50.7	50.3
Pentosans (percentage)						
in refined pulp	19.2	9.9	11.1	10.0	10.7	11.6
in alpha-cellulose	3.8	3.3	1.8	1.7	1.6	1.9
Ash (percentage)						
in refined pulp	0.8	0.5	0.7	0.8	1.1	0.5
in alpha-cellulose	0.1	0.2	0.2	0.2	0.2	0.2
7.14% NaOH soluble (percentage)						
of refined pulp	19.9	20.8	22.1	18.4	23.6	22.8
of alpha-cellulose	4.1	13.2	12.1	7.6	11.4	10.7
Viscosity (centipoises)						
refined pulp	78.4	23.1	48.7	65.4	45.1	49.2
alpha-cellulose	112.0	40.9	48.6	57.1	44.2	48.2

semichemical pulp contains 315 pounds of lignin. The following itemized account shows the distribution of cost for producing 1 ton of refined aspen pulp:

2400 pounds of aspen semichemical pulp at $25 per ton		$30.00
420 pounds chlorine (315 x 1⅓) at $0.02 per pound	$8.40	
31.5 pounds alkali (315 x 1/10) at $0.02 per pound	.63	
Hypochlorite	1.20	
Cost of chemicals	$10.23	10.23
Labor for chemically refining the semichemical pulp		5.00
Approximate cost per ton of refined pulp		$45.23

Data on the yield and properties of the refined pulps which were prepared from the three semichemical pulps are listed in Table VIII.

It may be noted in Table VIII that the yields of refined pulp prepared from the semichemical pulps range from 72.9 to 83.5%. On the basis of the wood they range from 59.5 to 63.0%.

The alpha-cellulose content of the refined pulp ranges from 78.0 to 82.9%. The remainder of the refined pulp may be considered hemicellulose. The alpha-cellulose content is from 46.4 to 52.1% on the basis of the wood, being lowest in shortleaf pine. These alpha-cellulose values on the basis of the wood are considerably higher than the corresponding values for alpha-cellulose from commercial pulps.

The pentosan value of the refined aspen pulp is 19.2% whereas those for the softwood refined pulps are from 9.9 to 11.6%. They are approximately 0.5 of the hemicellulose values except in the case of the aspen refined pulp in which out of 20.8 parts of hemicellulose there are 19.2 parts of pentosans.

Solubilities of the alpha-celluloses from the refined pulps in 7.14% sodium hydroxide range from 4.1 to 13.2%.

Viscosity values of the alpha-celluloses vary from 40.9 to 112 centipoises.

Pulp for White Paper

The two white spruce pulps listed in Columns 4 and 6, Table VIII, were extracted with 2% sodium hydroxide solution at 80 deg. C. for 2 hours so as to reduce their hemicellulose content and make them better suited for white papers. The residual pulps after the alkali extraction are listed as Pulps A and B in Table IX.

Pulp A is 57.2% of the wood and has an alpha-cellulose content of 85.8%. Pulp B is 57% of the wood and has an alpha-cellulose content of 86.5%. Viscosities of the alpha-cellulose from the two pulps are 54.5 and 53.1 centipoises, respectively.

Pulps A and B were separately treated in a 1.5-pound beater and test sheets were made from samples removed after various periods of beating. Physical properties of the pulps and the test sheets were determined by TAPPI Standard methods. The values are recorded in Table X.

Pulps A and B, before beating, had a freeness of 855 cc. and 860 cc., respectively. Both pulps lost their freeness rather rapidly with beating, dropping to 525 cc. and 520 cc. in 40 minutes, respectively. Test sheets prepared from a sample of Pulp A beaten 40 minutes have a burst of 1.67 points per pound per ream, tear of 1.35 grams per pound per ream, double folds 1229, tensile 13,400 pounds per square inch, solid fraction 0.52, stretch 8.00%, and opacity 57.0%. Test sheets prepared from samples of Pulp B beaten for 40 minutes have the following properties: burst 1.83 points per pound per ream, tear 1.36 grams per pound per ream, double folds 879, tensile 12,250 pounds per square inch, stretch 6.5%, opacity 55.0%, and solid fraction 0.53.

TABLE IX.—SOME PROPERTIES OF ALKALI-EXTRACTED REFINED WHITE SPRUCE PULP

Material	Yield on basis of wood, %	Alpha-cellulose on basis of— Pulp, %	Alpha-cellulose on basis of— Wood, %	Viscosity Pulp, centipoises	Viscosity Alpha-cellulose, centipoises
Pulp A	57.2	85.8	49.1	45.7	54.5
Pulp B	57.0	86.5	49.3	45.5	53.1

Production of High-alpha Pulp

The refined aspen pulp listed in Column 2, Table VIII, was converted to a high-alpha pulp which was tested for its suitability for cellulose derivatives. The high-alpha pulp was 49% of the wood, had an alpha-cellulose content of 98.7%, and a viscosity in cuprammonium solution of 112 centipoises according to the TAPPI Standard method. Tests by a commercial laboratory showed that the pulp acetylated readily.

Amounts of chemicals and conditions employed for preparing the high-alpha pulp were similar to those prescribed for the determination of alpha-cellulose. They would, undoubtedly, be too costly for commercial operations. The development of an economical procedure for the production of high-alpha pulp from refined semichemical pulp will be undertaken next year.

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TABLE X.—BEATER TEST VALUES OF PULPS AND TEST SHEETS

Material	Beating time, minutes	Freeness S.-R., cc.	Burst, points per lb. per ream	Tear, grams per lb. per ream	Double folds	Tensile, lb. per sq. in.	Stretch, %	Opacity, %	Solid fraction
Pulp A	0	855	0.82	2.75	382	4,060	5.25	80	0.40
	20	775	1.70	1.66	945	9,680	5.75	69	0.47
	30	660	1.65	1.59	1191	10,650	8.00	67	0.49
	40	525	1.67	1.35	1229	13,400	8.00	57	0.52
	50	405	1.72	1.25	1112	14,000	7.50	48	0.55
	60	295	1.68	1.19	1781	13,130	8.00	40	0.60
Pulp B	0	860	.94	2.53	568	4,230	5.25	81	0.41
	20	765	1.69	1.63	1037	10,170	6.25	69	0.47
	30	640	1.69	1.52	797	9,780	6.25	65	0.52
	40	520	1.83	1.36	879	12,250	6.50	55	0.53
	50	405	1.73	1.14	1357	13,770	6.75	46	0.57
	60	290	1.74	0.93	1552	13,100	6.75	36	0.59

A Study of the Wood Pulp–Cuprammonium Hydroxide System*

By T. A. Howells[1]

Abstract

A recently proposed theory of cellulose structure has been investigated with regard to its application to wood pulps. Contrary to the proposed theory, wood pulps were found to be almost entirely soluble in cuprammonium hydroxide. The resulting viscosity and the swelling behavior were unaffected by pectic solvents with the exception of acid, the latter causing degradation as evidenced by chemical analysis. The cuprammonium hydroxide-insoluble portion of wood pulp was separated and analyzed and the effect on the amount of it by treatment of the pulp noted. Extraction of wood pulp with ammonium oxalate had practically the same effect on chemical and physical properties as did extraction with hot water.

Beginning in 1934, a number of papers have been published from the Boyce Thompson Institute regarding the nature of cellulose, particularly that in the cotton fiber. One feature of the work of particular interest to cellulose chemists was the discovery in young cotton fibers of ellipsoidal particles of rather definite dimensions covered with a cementing material. The particles were isolated both by chemical and mechanical means and identified as cellulose. However, they failed to exhibit certain of the colloidal characteristics of cellulose, particularly solubility in cuprammonium hydroxide to yield solutions of relatively high viscosity. In contrast, the extracted pectic material was indicated as the component of the fiber causing the characteristic viscosity behavior. The crystalline properties of cellulose materials were ascribed to the cellulose component, the colloidal properties to the cementing material.

If these observations were substantially correct when applied to pulp fibers, considerable revision of our concept regarding the significance of viscosity and its application to the pulping of bleaching processes would be required. This work was initiated in the fall of 1936 to determine whether these observations and implications could be substantiated using wood pulp as a raw material in place of young cotton fibers. For a number of reasons, the data have not been published, although reference was made to one portion of the work by H. F. Lewis before the Fall Meeting held in Savannah in 1937 *(1)* and again before the February 1938 meeting *(2)* of the Technical Association of the Pulp and Paper Industry. No attempt has been made to carry either the historical review of the subject or the laboratory work beyond the stage of the original thesis (of which this report is a part) as submitted by the author to The Institute of Paper Chemistry in June, 1937. Nevertheless, at least passing mention should be made of the fact that several papers have appeared during recent months giving further experimental evidences in conflict with the Boyce Thompson work.

Historical Review

Cellulose in the form of cotton and as derived from wood has been the subject of a great deal of investigation and this work has been adequately reviewed at various times (*3* to *7*); therefore, no attempt will be made to discuss the various theories of the chemical and physical composition of cellulose. It will be of value, however, to note how several of these theories might be affected by the new theory of the structure of cellulosic materials.

Staudinger *(8)* believed cellulose was dispersed as molecules in a sufficiently dilute solution of cuprammomium hydroxide and determined the molecular weight of cellulose by a measurement of the viscosity produced. Kraemer and Lansing *(9)* also believed that cellulose was subdivided to a molecular dispersion. They converted cellulose to di- and triacetates and back again, determining the molecular weights at different phases by means of the ultracentrifuge. McBain and Scott *(10)* and others believed that the forces of association are too great to permit determination of the molecular weight from the viscosity.

Whatever the cause of cuprammonium viscosity —molecule length, association, or cementing materials—it is recognized in practice as a valuable criterion of "degradation" of cellulose. Kukolich *(11)* found a correlation between the viscosity of rag halfstocks and the strength of handsheets made from them. Bialkowsky *(12)* noted a correlation of viscosity with the folding endurance of sheets. Clibbens and Ridge *(13)* found that the viscosity correlated with the tensile strength of single fibers under widely varying conditions of treatment with acid and oxidizing agents. McGregor *(14)* degraded rag, alpha, and Mitscherlich pulps by means of heat, bleach, and acid, and found a correlation of the viscosity with the amount of degradation and with the folding endurance.

Farr and Eckerson *(15)* found in young cellulose fibers particles of uniform size, either separate or in bead-like strands. These particles they identified as cellulose by means of the refractive index (1.565 lengthwise, 1.530 cross-wise) and blue coloration with iodine and sulphuric acid. The particles appeared to be covered by a thin layer of material identified as pectic in nature by its nondouble refraction, solubility in alkali, and staining with Ruthenium red. When the fiber is five or six days old, the membrane has gained a layer of fibrils supposedly composed of the ellipsoidal particles.

By treatment with concentrated hydrochloric acid at room temperature, cotton was finally separated into a mass of particles. These particles were stained blue with iodine-sulphuric acid, were doubly refractive in polarized light, and in x-ray analysis gave a Debye-Scherrer ring for cellulose similar to the powder diagram obtained by cutting cotton fibers into small

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fragments and pressing them into a pellet. It was suggested that the micelles frequently assumed on the basis of x-ray and swelling data might in reality be these cellulose particles.

"The cellulose particles will account for the crystalline behavior and the cementing material for the colloidal behavior . . . Many of the fiber reactions which have been designated in the past as cellulose degradation represent only membrane disintegration. The cellulose particles themselves remain apparently unharmed, in the form of a white powdery residue."

Farr *(16)* made the following observations regarding these particles: "The behavior of cotton fibers in solutions of cuprammonium has been studied in the light of the previously demonstrated structure of the cellulose membrane. The two primary cell membrane components, the cellulose particles and the cementing material which holds them together were studied separately. The cellulose particles failed to produce viscosities more than appreciably higher than the viscosity of the cuprammonium solution itself. Highly viscous solutions were produced, however, when cementing material, from citric acid extractions, was added to the cuprammonium solution. Equal quantities of cotton fibers treated for increasing lengths of time with 1% potassium hydroxide or 0.5% ammonium oxalate produced decreasing viscosities in the same order, when added to cuprammonium. When small quantities of cotton fibers were added to excessive amounts of cuprammonium, the viscosity of the solution was low enough to permit the falling of the cellulose particles to the bottom of the flask. They were recovered and their size, shape, optical properties and microchemical properties were found to be unchanged. It may be concluded therefore, that the cellulose component of the plant cell membrane does not dissolve in cuprammonium to produce the viscosities commonly attributed to it, but that the cementing material which surrounds the particles is responsible for this much-discussed phenomenon.

"In conclusion it must be emphasized that the data presented concerns cellulose membrane formation and not cellulose formation . . . Nor have we any basis at present for applying these data to the presumably more complex lignified and suberized plant cell membranes."

In another place, Farr *(17)* stated: "A microscopic examination of the mixture of cotton and cuprammonium hydroxide corroborates this chemical behavior. The particles are seen to be dispersed throughout the mixture. When removed from viscous matrix they are still doubly refractive and react in their characteristic fashion to sulphuric acid and iodine.

"When a single fiber is treated with cuprammonium hydroxide, the outer limiting membrane does not dissolve. The rapidly swelling inner layers of the membrane burst through this resistant covering in a series of balloon-like enlargements. The cellulose particles are not visible at this point in the reaction. If, however, the swollen fiber is carefully washed with either cuprammonium or ammonia alone, it becomes evident that the presence of the particles has been obscured by the swollen cementing material. This reaction, too, may be carried past the point of disappearance in polarized light by washing the treated fiber with more of the cuprammonium. The double refraction of the cellulose portion of the fiber then reappears. . . .

"Among the many problems which we hope some day to study in detail are those of the hygroscopic behavior of fibers and their reactions to dyes. From scattered observations we have the impressions that the hygroscopic behavior of the fiber is primarily associated with the reactions of the cementing material to moisture, augmented by the fact that upon softening this material, the fibrils in the wall tend to straighten from their spiral positions in the lamellae. We believe also that in the various processes of dyeing we shall be able to differentiate between the reactions of the separable membrane constituents. These impressions must be checked and measurable factors which enter into these reactions determined."

Various investigators have made contributions to the present sum of knowledge regarding the correlation of the chemical and physical properties of pulps. Roth *(18)* found that cold extraction of pulp with alkali to remove pentosans prevented development of strength when beaten. Young and Rowland *(19)* reported a linear relation between the pentosan content and the swelling capacity for soft wood pulps. Kress and Bailkowsky *(20)* had previously found a correlation between the swelling capacity and the ease of beating of the same pulp in different liquids. Richter *(21)*, Schwalbe *(22)*, and Wenzl and Congehl *(23)* found that pulps purified by alkaline extraction were more difficult to beat. Jonas and Rieth *(24)* observed a correlation of strength with the mannan content. Obermanns *(25)* found that overbleaching rags at elevated temperatures to produce degradation made the rags beat more easily, at the same time decreasing the strength and viscosity and increasing the copper number. Schorger *(26)* observed that treatment with hydrochloric acid reduced the beating time if the treatment was not excessive. Thus it appears that strength and ease of beating of pulps depend to a considerable degree on the presence of certain materials in the pulp sometimes referred to as hemicelluloses. These are usually considered to be materials of a lower molecular weight than cellulose and hence more reactive. If these hemicelluloses are removed by alkaline extraction the pulp becomes more inert and thus more resistant to beating. On the other hand, if the amount of these materials is increased by acid or other degradation of cellulose, the pulp beats more easily, assuming the degradation is not carried too far.

Farr *(27)* suggested that many fiber reactions designated in the past as cellulose degradation were in reality membrane disintegration, the cellulose particles remaining unharmed. It is hard to believe that cellulose would be unharmed by concentrated hydrochloric acid, when fuming hydrochloric acid readily dissolves it and dilute acids readily hydrolyze lower polysaccharides. It would also be difficult to explain the relation between copper number, viscosity, and strength of cellulose modified by acids, as found by Birtwell, Clibbens, and Geake *(28)*. On the basis of previous work on viscosity, it is not surprising that "cellulose particles" isolated by treatment with concentrated hydrochloric acid failed to increase the viscosity of cuprammonium hydroxide appreciably.

It would be more surprising if such particles could be isolated by means of a dilute alkali treatment, since a prolonged alkali boil is recommended as a preparation for standard cellulose from raw cotton by the Division of Cellulose Chemistry of the American Chemical Society *(29)*. Other workers *(23)* have found that alkaline treatments lower the viscosity of cellulose very little or even raise it.

Farr *(30)* has stated " . . . that the wood fiber—the young wood cell—is built up by means of cellulose particles layer upon layer." On this basis it does not seem probable that cellulose in the wood fiber would have a fundamentally different structure than that in cotton. It hardly seems possible, however, that any material of a pectic nature could survive the pulping and bleaching processes. Because wood pulp shows no signs of disintegrating or being modified in such a way as to become insoluble in cuprammonium hydroxide, the possibility is suggested that the cementing material is of a different nature. Ritter *(31)*, by means of strong acids, has dissected wood fibers into small particles and the presence of a membrane has been suggested by Lüdtke *(32)*.

Sakostschikoff *(33)* claimed to have isolated cross-elements from wood fibers and from cotton by the action of sulphuric acid and also by centrifuging cuprammonium solutions of cotton. These cross-elements are assumed to have the same composition as Lüdtke's cross-elements. Lewis and Brauns *(34)* found that certain wood pulps contained a fraction which was insoluble in cuprammonium hydroxide. A yield of 1.36% was obtained from one pulp and a much smaller yield from a specially purified alpha pulp.

It is readily apparent that if Farr's theories on cellulose structure can be applied to mature cotton and to wood pulps, considerable revision must be made in the interpretations of work done to date. If cellulose does not dissolve in cuprammonium hydroxide, the fundamental assumption underlying the work on the determination of the molecular weight of cellulose in solution is incorrect. If the pectic membrane is the cause of cuprammonium viscosity, then it must also be related to strength properties. If cellulose and membrane can be separated by various extractions, new fields are opened for investigation into the nature of the strength of pulp and for industrial methods for the control of pulp properties.

It was the purpose of this study to determine whether such correlations and possibilities could be found for wood pulps.

The Cellulose-Cuprammonium Hydroxide System

Samples of bleached Mitscherlich pulp were extracted at 1% consistency with various solvents, filtered, washed with hot distilled water, and air dried, after which the viscosity was determined by TAPPI Standard T 206 m-37. A check on the effect of heat was made by moistening samples of pulp, heating, and air drying without filtering and washing.

The yield and viscosity data are given in Table I.

TABLE I.—THE EFFECT OF EXTRACTION WITH PECTIC SOLVENTS ON THE VISCOSITY OF THE EXTRACTED PULPS

				Bleached Mitscherlich	
Solvent	Concn., %	Temp., deg. C.	Time, hr.	Yield on Extraction, %	Viscosity of Pulp, centipoises
Blank	..	..	..	...	32.8
Heat	..	95	18	...	28.4
Water	..	95	18	...	27.5
Ammonium oxalate	0.5	75	1	...	32.1
Ammonium oxalate	0.5	75	15	...	30.4
Ammonium oxalate	0.5	95	18	98.7	29.6
Ammonium oxalate	5.0	95	21	...	29.0
Hydrochloric acid	0.01*N*	95	18	97.7	9.5
Sulphuric acid	1.0	95	1	99.3	15.6
Sulphuric acid	1.0	95	18	95.1	7.2
Sodium hydroxide	0.05	95	18	...	27.2
Sodium hydroxide	1.0	95	1	90.0	28.1
Sodium hydroxide	1.0	95	18	79.6	29.6

Alpha-, beta- and gamma-cellulose and copper number were determined on the bleached Mitscherlich pulp treated with 0.01 *N* hydrochloric acid; the results are given in Table II.

TABLE II.—CHANGE OF CHEMICAL CONSTANTS OF ACID-TREATED PULP

	Original	Acid-Treated
Yield, %	....	97.7
Alpha-cellulose, %	82.6	79.9
Beta-cellulose, %	4.7	5.2
Gamma-cellulose, %	12.7	14.9
Loss of alpha-cellulose, %	....	4.5
Copper number	2.68	3.06
Viscosity	32.8	9.5

The data in Table I show that common pectic solvents, with the exception of acids, have no effect on the viscosity of wood pulp. The slight decrease in the values for the treated pulps can be ascribed to the effect of heat in the presence of water. The decrease in viscosity by acid treatment can be explained by chemical hydrolysis, dissociation, or disintegration of a membrane. If it were the latter, there should be little change in the chemical analysis. An increase in copper number and a decrease in alpha-cellulose is shown in Table II. If cellulose is assumed to be unaffected by acid, the loss in alpha-cellulose must be made up of loss in membrane, making the membrane at least 4.5% of the fiber. Since higher viscosities than that of this untreated pulp can be obtained for wood pulps and much higher ones for cotton, we must then assume, if the viscosity is due to membrane, either that the membrane makes up a large part of the fiber or that the material is of a different nature in different pulps.

Since Farr found that large amounts of material could be extracted from cotton fibers by ammonium oxalate and that these extracted fibers showed almost no viscosity in cuprammonium hydroxide, a test was also run on cotton. The fibers were extracted as before with 0.5% ammonium oxalate at 75 deg. C. for 15 hours, washed, dried, and the viscosity determined, using only one half the TAPPI Standard concentration in order to keep the viscosity within a measurable range. The viscosity after extraction increased from 36 to 42, a change which may have been within experimental error, since this series was difficult to handle and results were not as accurate as in the previous series. There exists the possibility that material of low viscosity was removed by the ammonium oxalate extraction.

A commercially purified wood pulp (analysis in Table III) was extracted with 0.5% ammonium oxalate at 95 deg. C. for 18 hours, although it is difficult to see how any cementing material of a pectic nature could have remained in the pulp after purification. Following extraction, the viscosity dropped from 45.1 to 36.6; this decrease is about the same as that found on treatment of bleached Mitscherlich pulp under the same conditions, either with water or with ammonium oxalate solution.

TABLE III.—CHEMICAL ANALYSIS OF SPECIALLY PURIFIED PULP

Alpha-cellulose, %	99.1
Pentosans, %	0.7
Ash, %	0.077
Copper number, %	0.049

Even if the nature of the cementing material were known, it is questionable whether it could be added to pulp in such a way as to approximate the natural state. If the viscosity of solutions of cellulosic materials in cuprammonium hydroxide is due to the effect of highly viscous pectic materials, it should be possible to change the viscosity of cuprammonium hydroxide very appreciably by the addition of varying

amounts of pectic materials. Since only a small amount of pectin is known to be present in fibers, correspondingly small amounts were used. Two types of pectin were used—one was a dry material (Eastman Kodak Company lemon pectin) prepared by citric acid extraction; the other was Certo, a commercial pectin solution. When pulp and Certo were used together, difficulty was experienced in dispersing them. Cuprammonium hydroxide of higher copper content prepared according to American Chemical Society procedure was also tried *(35)*. This contained 30 grams copper, 165 grams ammonia and 10 grams sucrose per liter, as compared with 15 grams copper, 200 grams ammonia and 2 grams sucrose per liter in TAPPI Standard cuprammonium hydroxide. The results of these tests are given in Table IV. Slight increases in viscosity were obtained by addition of pectin but not great enough to begin to explain the viscosities obtained from cotton. No claim is made, however, that this method in any way duplicates the natural state.

TABLE IV.—THE EFFECT OF THE ADDITION OF PECTIN TO CUPRAMMONIUM HYDROXIDE

Cuprammonium Hydroxide	Concn. of Pulp, %	Kind of Pectin	Concn. of Pectin, %	Viscosity of Solution. centipoises
TAPPI	0.00	Lemon	0.00	1.36
TAPPI	0.00	Lemon	0.001	1.36
TAPPI	0.00	Lemon	0.01	1.36
TAPPI	0.00	Lemon	0.1	1.40
TAPPI	0.00	Certo	0.00	1.34
TAPPI	0.00	Certo	0.05	1.39
TAPPI	0.00	Certo	0.1	1.54
TAPPI	1.00	Certo	0.00	35.4
TAPPI	1.00	Certo	0.10	33.8
A.C.S.	0.00	Certo	0.00	1.40
A.C.S.	0.00	Certo	0.05	1.39
A.C.S.	0.00	Certo	0.10	1.41

The swelling characteristics of cellulose fibers in cuprammonium hydroxide are usually explained by theories similar to that of Lewis *(36)*, who assumes the formation of an osmotic cell, the outer membrane of the cell constituting a semipermeable membrane. Cuprammonium hydroxide diffuses through this membrane and combines with the cellulose but the cellulose-copper complex can not diffuse back, thereby building up an osmotic pressure which expands the fiber. If cellulose itself is not affected by cuprammonium hydroxide, the swelling must be due to an interaction of cuprammonium hydroxide and the cementing material. Treatment with pectic solvents should remove this cementing material and thereby prevent swelling. The swelling behavior of certain of the pulps extracted for viscosity determinations was studied in graduated strengths of cuprammonium hydroxide. TAPPI cuprammonium hydroxide was diluted with various amounts of distilled water, the percentage subsequently referred to being the amount of TAPPI cuprammonium hydroxide present in the diluted solution. A few fibers of pulp were mounted in water on a microscope slide, covered with a cover glass, and adjusted on a microscope. Beginning with 10% cuprammonium hydroxide (one part TAPPI strength to nine parts of water), cuprammonium was added at one side of the cover glass and drawn off at the other. When the effects at one concentration had been observed, the next stronger solution was used.

The pulps treated with heat, hot water, ammonium oxalate, and alkali all swelled at the same concentration of cuprammonium hydroxide (25% TAPPI) and with the same type of swelling as did the original pulp. The slight differences observed were probably due to variations within the same pulp. The pulp prepared by treatment with 1% sulphuric acid for one hour at 95 deg. C. showed only a faint suggestion of ballooning, without true balloons being formed. The helical windings became visible, the fiber swelled, and started to dissolve. With 18 hours' acid treatment, fibrillation resulted at a lower concentration (20%) than that at which ballooning took place in the untreated pulp (25%). The size of the fibrils was not uniform. With increasing strength of cuprammonium hydroxide, the fibrils dispersed, leaving a gelatinous, almost invisible mass which, in turn, was further dispersed by stronger cuprammonium hydroxide.

To investigate the solubility of cellulose in cuprammonium hydroxide, several of the pulps treated for viscosity determinations were extracted with alcohol-benzene, washed in hot water, dried, and dispersed as 1% solutions in TAPPI cuprammonium hydroxide (omitting the sugar). Portions of these solutions were stoppered, protected against light, and stored in a refrigerator. To avoid any possibility of the viscosity being too high to permit settling, 10 cc. of the 1% dispersion were diluted to 70 cc. with distilled water, mixed, and allowed to stand. At the end of five weeks, the tubes were examined and an estimation made of the amount settled. The amount settled from the dilute dispersion was so slight no estimation could be made. The results of the other tests are given in Table V.

TABLE V.—THE SEPARATION, BY SETTLING, OF MATERIAL INSOLUBLE IN CUPRAMMONIUM HYDROXIDE

Extracting Agent	Concn., %	Temp., deg. C.	Time, hr.	Quantity Settled from 70 cc. of 1% dispersion, cc.
Blank	..	..		1.5
Heat	..	95	18	0.8
Water	..	95	18	0.8
Ammonium oxalate	0.5	95	18	About 1.0
Hydrochloric acid	0.01N	95	18	0.5
Sulphuric acid	1.0	95	18	Trace
Sodium hydroxide	0.05	95	18	Unsettled
Sodium hydroxide	1.00	95	18	Trace

Farr obtained almost quantitative yields of cellulose from cuprammonium solution. The above figures are not quantitative and merely indicate the relative volume of settled swollen flocculent material; the weight of material obtained on drying would be very small. The interesting part is that the untreated pulp showed the greatest amount of insoluble material, with the possible exception of the ammonium oxalate-treated pulp which would not settle.

A quantitative determination was then made of the amount of cuprammonium hydroxide-insoluble material in the various pulps. The pulps were dispersed in TAPPI cuprammonium hydroxide (without sugar), centrifuged, and the clear liquid decanted off. Fresh cuprammonium hydroxide was then added to the residue and the process repeated until no more soluble material was removed, as shown by acidification of the decanted cuprammonium hydroxide. The residue was then repeatedly washed with 1:1 ammonium hydroxide to remove the excess copper, filtered on a Gooch crucible, washed with alcohol and ether, dried to constant weight, and ashed. Various modifications in the size of the sample and the method of dispersion and removal of cuprammonium hydroxide were used. This accounts for the various sample weights in Table VI. Bleached Mitscherlich pulp was used and extractions made at 95 deg. C. for 18 hours, using 1% sulphuric acid, 1% sodium hydroxide, and 0.5% ammonium oxalate.

It might be possible by various adjustments of the

TABLE VI.—DETERMINATION OF CUPRAMMONIUM HYDROXIDE-INSOLUBILITY

Sample	Sample, g.	Ash-free Yield, %
Bleached Mitscherlich sulphite	4	1.08
Bleached Mitscherlich sulphite	2	0.75
Bleached Mitscherlich sulphite	1	2.19
Bleached Mitscherlich sulphite	1	1.95
Bleached Mitscherlich sulphite	1	1.82
Bleached Mitscherlich sulphite	80	2.78
Ammonium oxalate extracted	1	1.91
Ammonium oxalate extracted	1	1.99
Hot water extracted	1	0.6
Hot water extracted	1	0.9
Alcohol-benzene extracted	10	0.99
Alcohol-benzene extracted	10	1.38
Alcohol-benzene extracted	10	1.57
Acid extracted, followed by alcohol-benzene	10	0.16
Acid extracted, followed by alcohol-benzene	10	0.17
Alkali extracted, followed by alcohol-benzene	10	0.04
Alkali extracted, followed by alcohol-benzene	10	0.09
Ammonium oxalate extracted, followed by alcohol-benzene	10	1.60
Ammonium oxalate extracted, followed by alcohol-benzene	10	1.74

concentration to make cellulose reprecipitate from cuprammonium solution, but in the results shown above, the material was treated with cuprammonium hydroxide until there was no further solvent action. Even allowing for the large errors apparently possible, certain trends appear. Hot water treatment reduces the insoluble fraction. This may be due to extraction or to the effect of heat. Lewis and Brauns *(34)* observed that the action of heat rendered the primary lamella either more brittle or less resistant to the solvent action of cuprammonium hydroxide. Ammonium oxalate appears to cause a slight increase in the insoluble fraction, possibly due to reaction of the oxalate with the calcium of the ash or to retention by the pulp of the oxalate itself. The presence of either oxalate would not be entirely accounted for by the ash, because both would break down on ignition.

It might be supposed that the cuprammonium hydroxide-insoluble fraction could be identified as the part of the fiber responsible for the limiting membrane of the balloons. When the pulp is treated with acid, whatever causes constrictions and ballooning is so modified that the ballooning no longer takes place (in other words, the insoluble membrane is removed). This correlates with the decrease in the cuprammonium hydroxide-insoluble portion. However, when the pulp is extracted with alkali, the insoluble portion is reduced practically to zero, although ballooning does not seem to be affected. This does not mean that the insoluble portion is not connected with the membrane but rather that, in the determination of the insoluble portion, strong cuprammonium hydroxide is used and the solvent action allowed to go to completion. It is quite possible that various parts of the cell wall could differ in their resistance to the solvent action of cuprammonium hydroxide and yet the entire wall would be completely soluble in strong cuprammonium hydroxide.

The 80-gram sample mentioned in Table VI was washed with alcohol and ether and dried over concentrated sulphuric acid in a vacuum desiccator. A higher yield was obtained on this sample, possibly because it was not previously extracted with alcohol-benzene and was dried differently. A micro-ash determination was started on this material but it was found to be very hygroscopic. It was then allowed to come to equilibrium with the atmosphere, the moisture content calculated from the increase in weight and the ash content calculated to the dry basis. A sample was then treated with 42% hydrochloric acid, diluted, and the insoluble portion filtered off. The filtrate was then treated to remove copper, decolorized, concentrated under vacuum, neutralized, and diluted to 5%. The test for mannose (with phenylhydrazine) was negative. Total reducing sugars were determined by the usual methods and hexoses and galactose by selective fermentation. Considering all other sugars as pentoses, the following results were obtained (Table VII).

TABLE VII.—NATURE OF THE FRACTION INSOLUBLE IN CUPRAMMONIUM HYDROXIDE

Total yield (on original pulp), %	3.28
Moisture content of isolated material at equilibrium with the atmosphere, %	5.2
Ash content (on dry basis), %	15
Fraction insoluble in acid (on dry basis), %	3
Total reducing sugar (on dry basis), %	62
Composition of reducing sugar	
Mannose, %	0
Glucose, %	82
Galactose, %	3
Pentoses, %	15

The ash content of the material was only about half that reported by Lewis and Brauns *(34)* for similar material isolated from west coast bleached sulphite pulp. The acid-insoluble material was partly soluble in ether and left a small amount of ash on ignition; one possible constituent might be the calcium or copper salt of resin acids. The yields of sugar reported should be considered as a minimum, because losses in handling or from degradation may have reduced it. If corrected for ash and acid-insoluble material, the yield would be 76%, high enough to indicate that the material is largely carbohydrate. Since fermentation methods are seldom 100% accurate, the reported 15% pentoses might be considered as a maximum, because it contains any unfermented hexoses.

The Effect of Extraction of Bleached Mitscherlich Pulp with Hot Water and with Ammonium Oxalate

A bleached Mitscherlich pulp with an alcohol-benzene solubility of 1% and lignin content less than 0.1% was used. In Series A, 100 grams of pulp were extracted with 1500 cc. of extracting agent for 10 hours at 95 deg. C., strained on cloth, and washed with distilled water and tap water. In Series B, the pulp was extracted at about 2% consistency, agitated with a Lightnin mixer, and held at 85 deg. C. for 10 hours. Extraction IX was made using three short extraction periods instead of one long period, washing the pulp between extractions, and dispersing in fresh ammonium oxalate. In Extraction VIII, the effect of heat alone was determined by moistening the pulp with water, subjecting it to the same heat, and then allowing the pulp to dry without removal of the soluble material.

Yields were not determined in Series A. In Series B, moisture tests and ash tests were made and yields calculated to the moisture-free, ash-free basis. The extracted pulps showed an appreciably higher ash content, probably because they were washed with calcium-containing tap water before all the oxalate could be removed with distilled water.

TABLE VIII.—MOISTURE-FREE, ASH-FREE YIELDS, SERIES B

Extraction	Type of Treatment	Ash Content, %	Ash-free Yield, %
VI	Hot water extraction	0.24	99.2
VII	Ammonium oxalate extraction	3.4	98.7
VIII	Heat in presence of water	0.26	100.0
IX	Repeated ammonium oxalate extraction	1.2	96.9

Various writers have pointed out that pectin in wood may be protected from the action of pectic solvents by deposits of other materials. It seems very unlikely that any deposit of truly pectic material

could survive the pulping and bleaching processes. On extraction, ammonium oxalate seems to remove slightly more material than does hot water. The increase in the amount removed by repeated extractions with ammonium oxalate may be caused in part by mechanical losses, because the pulp was handled three times as much.

Chemical tests were made on the extracted pulps. Alpha-cellulose, copper number and cuprammonium viscosity were run by TAPPI Standard methods; gamma-cellulose and pentosans by Institute methods and beta-cellulose was calculated by difference. Even admitting the existence of particles and membranes, there should be no great change in the chemical analysis, because the cellulose particles are assumed to make up the greater part of the fiber and to remain practically unchanged. The net result of the extractions appears to be a combination of purification and degradation, the former reflected by a decrease in copper number by extraction of the least resistant parts, the latter by a decrease in viscosity by the hydrolytic action of heat in the presence of water.

TABLE IX.—CHEMICAL ANALYSES, SERIES A AND B

			Cellulose					
Pulp	Treatment	Ash, %	Alpha, %	Beta, %	Gamma, %	Pentosans, %	Copper Number	Viscosity, centipoises
...	Blank	0.35	82.6	4.7	12.7	7.0	2.69	30.6
IV	Hot water	0.20	82.9	4.0	13.1	6.3	2.46	27.3
V	Ammonium oxalate	0.49	82.1	4.4	13.5	6.8	2.35	28.7
VI	Hot water	0.24	82.6	3.8	13.6	6.3	2.45	24.7
VII	Ammonium oxalate	3.4	82.0	4.1	13.9	5.7	2.35	24.8
VIII	Heat only	0.26	82.5	3.5	14.0	6.4	2.49	28.3
IX	Repeated ammonium oxalate	1.2	82.9	3.7	13.4	5.8	2.26	29.3

One sample of bleached Mitscherlich pulp was extracted with hot water at 95 deg. C. for 18 hours, the filtrate collected and evaporated under vacuum at 35 deg. C. A similar extraction was made with 0.5% ammonium oxalate; one half the filtrate was concentrated and the other half was treated with lime to remove the oxalate, filtered, and then concentrated. Total reducing sugars were determined by hydrolysis with boiling 3% sulphuric acid, neutralizing with calcium carbonate, and testing the filtrate. Because all the material was not rendered soluble by this hydrolysis, the residue was filtered before neutralizing and weighed. Aliquot samples were evaporated to dryness *in vacuo* and used for lignin determinations. Pentosans were determined on liquid samples, adjusting the strength of the hydrochloric acid to compensate for water in the samples. Uronic acid anhydride was determined from the carbon dioxide evolution when boiled with 12% hydrochloric acid. The results are given in Table X.

TABLE X.—THE NATURE OF HOT WATER AND AMMONIUM OXALATE EXTRACTS

	Percentage of Total Solids		Percentage of Original Pulp	
	Hot Water	Ammonium Oxalate	Hot Water	Ammonium Oxalate
Total solids	..	..	1.05	1.01
Ash content	17	18	0.18	0.18
Reducing sugar	46	40	0.48	0.40
Dilute acid insoluble	4	3	0.04	0.03
Lignin	1	4	0.01	0.04
Pentoses	28	34*	0.29	0.34*
Uronic acid anhydride	8	8	0.08	0.08

* All tests except this one were made on the filtrate after removal of oxalate.

No great difference appears in the analysis of the two extracts. The differences may or may not be significant, because the small amount of material and its nature were not conducive to great accuracy. Farr found 14% carbon dioxide in extracts prepared by her method, corresponding to 56% uronic acid anhydride or 79% pectin. This value, compared with 88% pectin in apple pectin and 90% pectin in citrus pectin, indicated that her extracted material was very largely pectic in nature. By the same analogy, the material extracted in this case is not pectic in nature.

Conclusions

Pectic solvents, with the exception of acids, have no effect on the viscosity of wood pulps in cuprammonium hydroxide solution.

Acids lower the viscosity but this change is accompanied by a degradation of the cellulose as evidenced by chemical analysis.

The addition of pectin to cuprammonium hydroxide and to solutions of cellulose in cuprammonium hydroxide does not appreciably change the viscosity.

The swelling behavior of the fibers in cuprammonium hydroxide is unchanged by pectic solvents, with the exception of those pulps treated with acid.

Wood cellulose, as such, can not be settled or centrifuged out of solution in cuprammonium hydroxide, except for a few per cent of insoluble material.

The amount of this insoluble material is not affected by ammonium oxalate extraction of the pulp, but is reduced practically to zero by acid or alkali treatment of the pulp.

The cuprammonium hydroxide - insoluble material is apparently a definite compound of copper with some material in the pulp, and is broken down by acidification.

The ash-free portion of this copper compound is largely carbohydrate in nature.

Extraction of wood pulp with ammonium oxalate, a standard pectic solvent, has no appreciably greater effect on the chemical and physical characteristics of the pulp than has extraction with hot water. These effects can be explained on the basis of purification of the pulp and can be made to fit into almost any theory of cellulose behavior.

The nature of the material extracted from wood pulp by hot water and by ammonium oxalate is essentially the same.

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A Study of the Behavior of Alumina in Relation to Sizing*

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Abstract

The importance of alumina in the papermaking system and the concepts of the colloidal theory of rosin sizing at once brings up questions concerning the chemical and colloidal behavior of this material. The effects and applications of alumina in the papermaking system are both chemical and colloidal and no rigid line of demarcation can be drawn between these two groups of properties. The marked colloidality of alumina is greatly affected by the presence of noncolloidal substances and the presence of alumina complicates the behavior of electrolytes in solution.

This paper includes a general survey of some of the phenomena of the behavior of alumina, aluminum salts, and rosin size. The zones of complete precipitation of alumina from aluminum salts at various hydrogen ion concentrations, as well as those for rosin and rosin-alumina complexes, are given. The occurrence of two types of precipitates, one voluminous and gelatinous and the other crystalline and dense, is observed and the zones of hydrogen ion concentration in which they are present are noted.

In order to obtain a picture of the colloidal behavior of rosin size and/or alumina, microelectrophoretic studies were made on these materials under various conditions of aging, anion valence and concentration, and hydrogen ion concentration. Prosize, a colloidally protected rosin size, was studied under comparative conditions with sodium resinate.

The relation of the zeta-potential or electrophoretic charge of the various materials in the papermaking system to sizing has been demonstrated.

In the ordinary process of sizing pulp with rosin and/or waxes and of precipitating starch or protein on the fibers, another important material, alumina, is provided in the papermaking system. Alumina, variously known as aluminum hydroxide or aluminum oxide, is generally added as aluminum sulphate or alum, but is also used in the form of sodium aluminate. Chemically, the true nature of alumina is still open to some question. It has been held to be an actual hydroxide, a hydrous oxide, a basic aluminum salt, or a colloidally active, positively charged, hydrated aluminum ion of the Werner-Pfeiffer type and up to the present each of the various theories still has its adherents.

Since most of the reactions of alumina in the papermaking system refer to precipitation phenomena, it is in order to review those papers which are of direct interest in this connection.

It has been observed for many years that the measurement of the hydrogen ion concentration of aluminum sulphate-alkali systems is subject to error due to variations in acidity of the floc as it ages. Early investigators [Theriault and Clark *(1)* and Wells *(2)*] found that constant electrometric potentials could not be obtained in alumina floc as the hydrogen ion concentration increased with the time of standing. Later studies by Weiser *(3)* have shown that the pH of a positively charged sol of alumina, peptized by aluminum chloride, decreases on aging. This should be compared with the work of Thomas and Whitehead *(4)* who found that, in general, the pH of positively charged alumina sols peptized with hydrochloric acid increased on aging.

The limits of the zones of precipitation of alumina by means of alkalies from various solutions have been established for certain cases by Miller *(5)* and Blum *(6, 7)*. According to Thomas *(8)* "these ranges represent zones of flocculation and not of insolubility because the insoluble hydrous oxide formed in the presence of chloride ion remains in colloidal solution throughout the lower pH values due to the strong stabilizing action of hydrogen ion and the weak precipitating power of chloride ion." Research by Miller *(5)*, Black, Rice, and Bartow *(9)*, Baylis *(10)*, and many others on the use of alumina for water

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treatment has shown the importance of hydrogen ion concentration, as well as the effects of the anion of the aluminum salt or other anions and their concentrations upon the zone of flocculation.

Two types of floc from aluminum salts were mentioned by Theriault and Clark *(1)*, and they observed the white, dense form in the alkaline range of precipitation. Miller *(11)* has reported the effect of hydrogen ion concentration in producing a dense, heavy floc, as well as a voluminous, gelatinous floc, and suggested that the less voluminous precipitate may be more desirable in papermaking systems. The redissolving of the alumina floc with the addition of increasing amounts of alkali has long been known and is of importance in the preparation of alkali aluminates.

The effect of added sulphate ion in increasing the pH of alumina floc systems has been observed by Weiser *(12)* and Thomas *(13)* and various explanations for this phenomenon have been advanced based on the adsorption and "olation and oxolation" theories.

Experiments have been conducted toward the locations of the isoelectric point of alumina by Theriault and Clark *(1)*, Baylis *(14)*, and many others who located the optimum pH values for flocculation in raw waters. They generally define the isoelectric point of the floc as coinciding with the hydrogen ion concentration where the primary particles of alumina precipitate have a minimum repellency toward each other and agglomerate with the greatest rapidity.

A more critical method for locating the isoelectric points of such materials as clay, alumina floc, etc., was developed with the invention of a special type of microelectrophoretic cell by Mattson *(15)*. Larson *(16)* claimed to have confirmed Mattson's studies, particularly with reference to alumina floc. Hazel *(17)* and Hazel and McQueen *(18)* determined the mobilities of alumina sols and the effects of various anions in reducing the migration velocities.

One of the most important phases of the questions concerning the composition and behavior of alumina is its relation to the other colloidal materials in the papermaking system. Since Illig's discovery of sizing with rosin and alum in 1807, the role of alumina in sizing has been the subject of a great number of papers. Sutermeister *(19)*, Klein *(20)*, and Olsen *(21)* have so thoroughly reviewed the literature on sizing that mention need be made here only of the most recent theory of rosin sizing, the so-called "colloidal-electrostatic" theory.

Stöckigt and Klingner *(22)* first suggested that sizing is closely linked with the colloidal phenomenon of adsorption. Ostwald and Lorenz *(23)* studied the behavior of the components of the papermaking system by electrophoretic methods. They showed that pulp fibers in distilled water are negatively charged, that the addition of alum makes them positively charged, and that sizing efficiency is highest in the isoelectric zone where the effective negative and positive charges in the system are almost equal (the sum of the zeta potentials, as distinguished from the total or Nernst potential, is zero.) They demonstrated that too much alum made the system positively charged, whereas insufficient alum left the fibers and rosin hydrosol negatively charged; in either case, a mutual repellency between the fibers and rosin particles resulted except near the isoelectric point. Kanamaru and Tsuchida *(24)* carried out similar studies which confirmed the basic theory.

Presentation of Problem

Although the general effects of size and alum in the papermaking furnish are well known, it is necessary to employ some of the methods of colloid chemistry as well as more conventional procedures in studying the fundamental reactions which take place.

In approaching the study of the colloidal behavior of alumina and rosin alone or together and the possible effects of these substances on the phenomenon of sizing, two points of attack were outlined. (*a*) If analyses would define the zones of precipitation and peptization of alumina and/or rosin complexes, some analogy might be drawn to precipitation of size in the papermaking furnish by alum. (*b*) If microelectrophoretic measurements would show the magnitude and sign of the electrostatic charge on alumina and/or rosin at various hydrogen ion concentrations, the results could be examined in the light of the known facts relative to the colloidal theory of rosin sizing.

Preparation of Materials

The sodium abietate or resinate used for these experiments was prepared from a sample of Glidden's Nelio rosin which had a saponification number of 180. To prepare an exactly 0.1 *N* sodium resinate solution, 31.2 grams of Nelio rosin, an amount of standard sodium hydroxide solution containing 4 grams of NaOH, and a little water were heated together on a boiling water bath for one hour in order to disperse the rosin. After cooling, the solution was carefully diluted to one liter.

Since comparative studies of a completely saponified and a high-free rosin, protein-protected size were to be made, a sample of Prosize was prepared by first soaking 0.5 gram of soya protein for half an hour in a little water. Then 100 cc. of a 2.5% rosin emulsion were poured into the soya protein and water, and the mixture was heated with constant stirring at approximately 60 deg. C. for one hour. This emulsion contained about 70% combined and 30% free rosin. Just before removal from the water bath, 0.25 gram of boric acid in solution was stirred into the Prosize. The mixture was diluted to a final weight of 125 grams, giving a concentration of 2% rosin in the final emulsion.

Experimental Procedures

The experimental procedures of importance were the measurements of hydrogen ion concentrations, the "aluminon" test for unprecipitated alumina, a test for rosin in solution, analyses for sulphate and chloride ions, microelectrophoretic studies, and the preparation and testing of handsheets for sizing.

Most of the hydrogen ion concentrations were determined by means of a glass electrode-potentiometer setup or a Cameron pH meter.

The "aluminon" test, devised by Hammett and Sottery *(25)* and described by Treadwell *(26)*, was used for the qualitative detection of aluminum ion or alumina. This test utilizes aurintricarboxylic acid in alkaline solution which Hammett and Sottery state is sensitive to 5.5 parts per million of aluminum in solution.

A cloudiness or precipitate in filtered solutions on the addition of dilute hydrochloric acid indicated a positive test for rosin in solution. Sulphate was determined gravimetrically and Mohr's volumetric method of analysis was used for chloride.

The experimental procedure and equipment used

for the microelectrophoretic studies were similar to those described by Bungenberg de Jong and Teunissen *(27)*. Since it was unnecessary for comparative purposes to calculate either the mobilities or the zeta potentials of the colloidal particles, the actual particle velocities were measured at a voltage constant for all tests in the cell used. Therefore, v or velocity is defined as 1000 divided by the average time in seconds for the particles to migrate 0.0088 cm. under an applied direct current potential of 100 volts. When v was too small to be measured with any degree of accuracy the time of migration was recorded as being infinite, giving v an arbitrary value of zero which lies within the isoelectric zone. In the data, a positive sign for particle velocity means that the particle itself was positively charged and moved toward the cathode. A negative sign designates a negative charge and a particle migration toward the anode.

Presentation of Data

The first investigation had the following objectives. (*a*) The determination of the effect of hydrogen ion concentration on the complete precipitation of alumina from aluminum sulphate and aluminum chloride by sodium hydroxide. (*b*) Location of the isoelectric point of alumina flocs by measuring minimum precipitate volume within the zone of complete precipitation. (*c*) Observance of the different types of precipitates of alumina.

Two groups of systems, one 0.200 N and the other 0.020 N with respect to final alumina content, were mixed in test tubes with various amounts of sodium hydroxide. After 24 hours aging (to allow them to come to equilibrium in regard to floc packing and hydrogen ion change), these systems were observed for difference in precipitate form, the heights of the precipitate zones were noted, the hydrogen ion concentrations measured, and aluminon tests for the presence of unprecipitated aluminum carried out on the filtrate from the supernatant liquors.

It was found in the case of aluminum sulphate that precipitation began at a higher hydrogen ion concentration and became complete sooner than in the case of aluminum chloride. In both instances, as the systems became more strongly alkaline, the alumina redispersed as a sol and finally appeared to be a true solution. It was found that alumina from aluminum sulphate was completely precipitated from the solutions within a pH range of 4.3 to 10.0 and from aluminum chloride solutions within a range of 6.2 to 10.0. In both the aluminum sulphate and chloride systems which were 0.20 N with respect to alumina, two distinct types of precipitates were observed. Within the acid and alkaline zones of incomplete precipitation or partial peptization, a white, dense, crystalline-in-appearance floc occurred. In the center zone of complete precipitation of alumina, the floc was of the familiar voluminous gelatinous type. As Fig. 1 shows, this voluminous precipitate occurs over the region of hydrogen ion concentration in which the isoelectric point of the floc might be located; therefore, no minimum precipitate height was found within this zone of complete flocculation to indicate a possible point of isoelectric conditions. In the more dilute systems (0.020 N with respect to alumina), the dense floc was barely noticeable on the alkaline side and the balance of the precipitate was of the gelatinous sort.

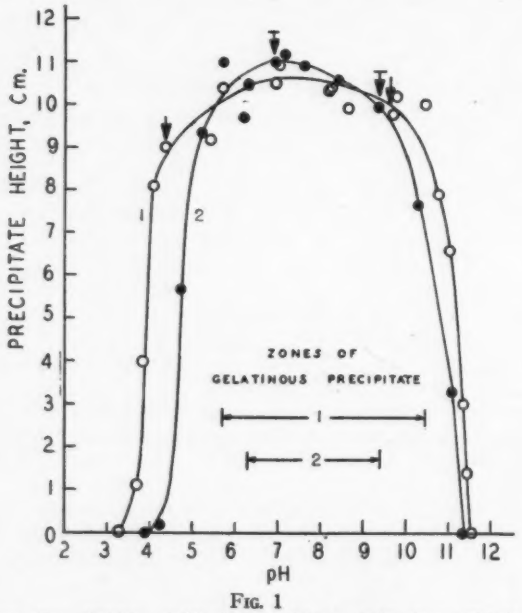

FIG. 1
Precipitate Heights. 1-Aluminum Sulphate. 2-Aluminum Chloride. Complete Precipitation between the Arrows

Because alumina and rosin are precipitated together in papermaking furnishes, systems were made up which were 0.010 N with respect to sodium resinate and contained increasing amounts of aluminum sulphate and aluminum chloride. After the samples reached equilibrium, tests for unprecipitated aluminum and rosin in the filtrate of the supernatant liquid showed that the alumina from both aluminum sulphate and chloride was completely precipitated at pH 4.3 and above. The presence of the rosin was equivalent to the sulphate ion in broadening the zone of complete precipitation. It was found that the rosin was completely precipitated at pH values below 7.5.

When equilibrium systems were prepared using sodium resinate and sulphuric acid instead of aluminum salts, it was found that the rosin was completely precipitated only below a pH of 6.2. This is to be compared with the precipitation value of 7.5 when alumina is present.

To continue the study of the zone of coprecipitation of rosin and alumina, systems were prepared which contained stoichiometrical proportions of aluminum sulphate and sodium resinate, together with sulphuric acid or sodium hydroxide, to give aluminum resinate (AlR_3) precipitated under different hydrogen ion concentrations. The acid was added with the aluminum sulphate and the alkali with the sodium resinate. The results showed alumina precipitated in its usual pH zone of 4.3 to about 10 and rosin was thrown out of solution of pH less than about 8.

In preparing for the microelectrophoretic studies on alumina, preliminary work was done to determine the effects of aging on alumina flocs produced by the addition of sodium hydroxide to systems 0.008 N with respect to aluminum. Since initial tests showed that acid alumina is positively charged and alkaline alumina is negatively charged, analyses were run on both acid and alkaline alumina to find the effect of aging on electrophoretic velocity, hydrogen ion concentration, and the sulphate and chloride ion concentrations of the supernatant liquid of the systems. The results showed that an aging time of 24 hours was sufficient for samples of floc which were to be used for the microelectrophoretic studies. Positively charged alumina from both salts showed an increase in positive electro-

phoretic velocity on aging, whereas negatively charged alumina showed an increase in velocity of migration toward the anode. There was an increase in the hydrogen ion concentrations of positively charged alumina floc and a decrease in the hydrogen ion concentrations of negatively charged alumina precipitates on aging. Aging did not affect the chloride ion content of the filtered supernatant liquid from the flocs, but there was some decrease in sulphate ion concentration of the liquid from both positively and negatively charged alumina precipitated from aluminum sulphate. This meant a corresponding increase in the sulphate ion held by the floc.

Some of the most important questions concerning alumina have been the location of isoelectric points and the effects of adsorbed ions and hydrogen ion concentration on the magnitude and sign of the electrophoretic charge. To find the isoelectric zones of alumina from both aluminum chloride and aluminum sulphate, microelectrophoretic studies were made on aged flocs precipitated at different hydrogen ion concentrations by sodium hydroxide from solutions 0.008 *N* with respect to alumina. Figure 2 shows these data. No actual isoelectric points were determined and the zero points were merely values within a narrow isoelectric zone.

In extending these studies to include an investigation of the immediate effects on the sign of the charge and the electrophoretic velocity resulting from a change in hydrogen ion concentration on positively and negatively charged flocs, hydrochloric acid and sodium hydroxide were used to vary the pH of the systems and microelectrophoretic analyses were made as quickly as possible. Although the data were highly erratic compared with equilibrium values, it was clearly demonstrated that the charge on alumina floc can be changed almost instantaneously from positive

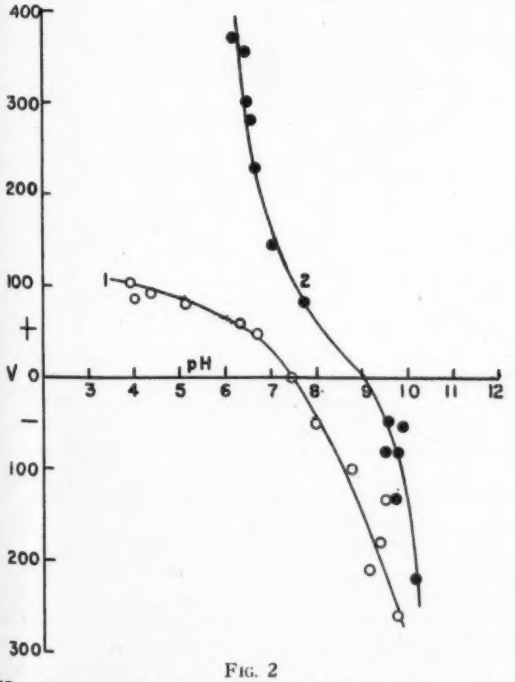

FIG. 2

Effect of Hydrogen Ion Concentration on the Electrophoretic Velocity of Alumina at Equilibrium. 1-Aluminum Sulphate. 2-Aluminum Chloride

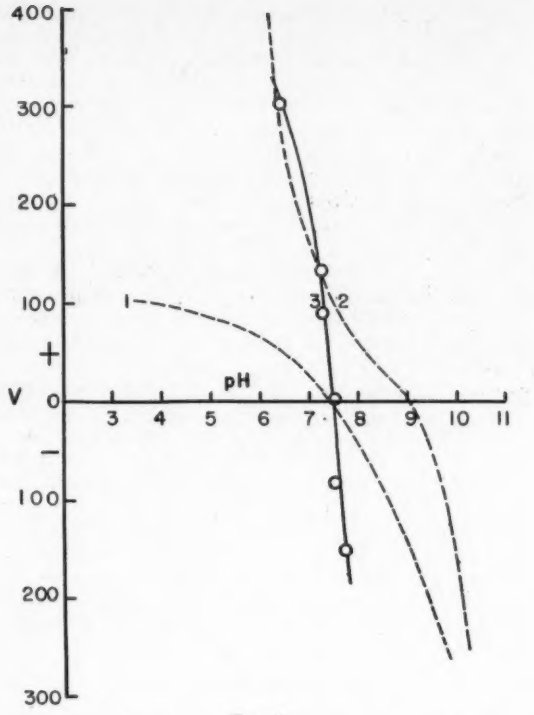

FIG. 3

Effect of Sulphate Ion on the Electrophoretic Velocity of Positively Charged Alumina from Aluminum Chloride. Equilibrium Values for: 1-Aluminum Sulphate. 2-Aluminum Chloride. 3-Effect of Increase in Sulphate Ion

to negative or vice versa, as a result of a decrease or an increase in the hydrogen ion concentration. It is of interest to note that the instantaneous values of velocity for flocs of aluminum chloride were much nearer equilibrium values than were those from aluminum sulphate.

Because of the observation that the electrophoretic velocity of positively charged alumina from aluminum sulphate was considerably less than that of positively charged flocs from aluminum chloride, the question arose as to whether or not this was entirely due to the presence of the bivalent, negative sulphate ion. Equilibrium systems were prepared by precipitating alumnia from aluminum chloride in the presence of sodium sulphate. The results showed a decrease in hydrogen ion concentration and a more negative or less positive electrophoretic velocity with increase in sulphate ion. When a ratio of alumina to sulphate ion equivalent to an aluminum sulphate system was reached, the velocity value fell on or near the equilibrium curve for that material as is shown by Fig. 3.

Some unexpected data were found in a study of the reactions between sodium resinate or Prosize and aluminum salts in systems 0.002 *N* with respect to alumina to which were added increasing amounts of the sizes. Figure 4 shows clearly the difference in the electrophoretic behavior of the various systems. Of particular importance is the marked positive character of the almina-Prosize agglomerates. It was observed that the precipitated particle size of the alumina-Prosize complex was much smaller than the comparatively large agglomerates resulting from the reaction of sodium resinate and aluminum salts.

Another investigation was made to discover the effect of hydrogen ion concentration on the electro-

phoretic velocity of particles precipitated from 0.0002 *N* solutions of sodium resinate or Prosize by sulphuric and hydrochloric acids. Figure 5 shows the effects of the sulphate ion, hydrogen ion concentration, and a protective colloid on the electrophoretic velocities of the size particles. Although the pH is below that of papermaking conditions, the existence of positively charged rosin particles is definitely established. The isoelectric zone of Prosize compares favorably with that of alpha protein which is employed as a protective colloid.

To correlate partially these changes in electrophoretic charge with the loss of sizing in paper furnishes, well-sized handsheet systems were prepared at ordinary papermaking hydrogen ion concentrations, diluted in the sheet mold with water, and then made less acid with various amounts of sodium hydroxide. The stock was immediately drained and a sheet formed to prevent as much repeptization of alumina and rosin as possible. The result was a decrease in size test with the decrease in hydrogen ion concentration. It would have been of interest at this point to have determined by analyses for alumina and rosin in the sheets whether or not they were repeptized, as would be shown by a decrease in their content, or whether the mordanting action was merely destroyed and no important decrease in size or alum content of the sheets occurred.

Discussion

The range of precipitation of alumina from aluminum chloride found in this investigation was broader than that found by Miller *(5)* and Blum *(6, 7)*; this may be ascribed in part to the concentration of the systems. Because of the adsorption of sulphate ion on positively charged alumina from aluminum sulphate, the zone of complete precipitation is extended on the acid side.

Although visual examination of the volume of alumina precipitated over a wide range of hydrogen ion concentrations did not reveal any inflection points which might represent a zone of isoelectric conditions,

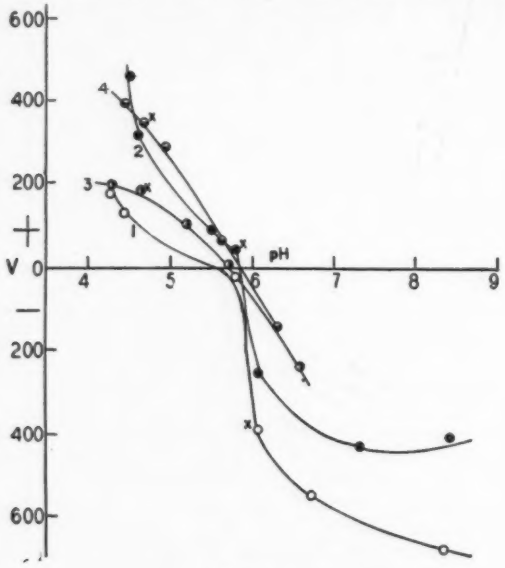

FIG. 4

Electrophoretic Velocity of Particles Precipitated from Aluminum Salt Solutions by Size Solutions. Sodium Resinate: 1-Aluminum Sulphate. 2-Aluminum Chloride. Prosize: 3-Aluminum Sulphate. 4-Aluminum Chloride. x-Equivalent Mixtures of Rosin and Al_2O_3

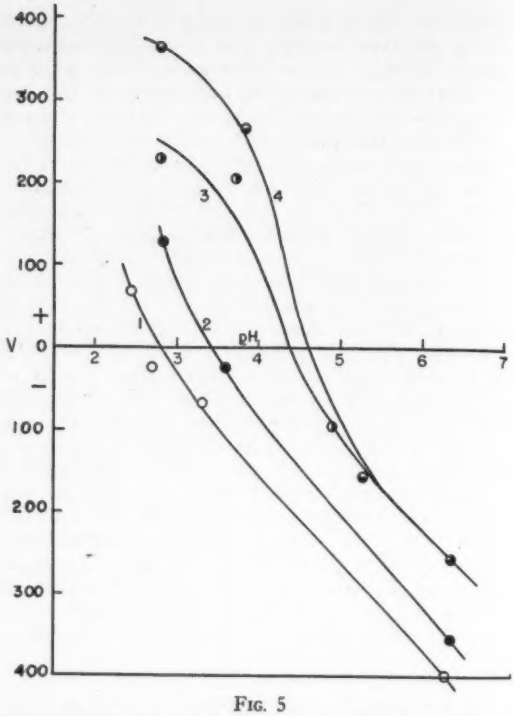

FIG. 5

Effect of Hydrogen Ion Concentration on the Electrophoretic Velocity of Particles from Size Solutions. Sodium Resinate: 1-pH Adjusted with Sulphuric Acid. 2-pH Adjusted with Hydrochloric Acid. Prosize: 3-pH Adjusted with Sulphuric Acid. 4-pH Adjusted with Hydrochloric Acid

nevertheless, the two types of precipitates of alumina and their zones of occurrence were observed. Miller's suggestion *(11)* that the less gelatinous or voluminous type of precipitate, in the acid range, might be more desirable than the gelatinous type for papermaking purposes would seem to require certain reservations as the gelatinous type appears to predominate within the zone of hydrogen ion concentration ordinarily employed in sizing. The markedly negative character of rosin proved to be as influential in broadening the zone of precipitation of alumina as did the sulphate ion. Aluminum sulphate has a stronger precipitating effect on rosin than sulphuric acid, because of lowering by the alumina of the electrophoretic charge on the rosin micelles condensed by acidity. The result is complete precipitation of rosin at a higher pH by alum than by acid.

The zones of precipitation and peptization of alumina and rosin observed in the so-called aluminum resinate systems precipitated at various hydrogen ion concentrations lead one to believe that the phenomenon is one of coprecipitation of the two materials as an alumina-rosin complex rather than as aluminum resinate. The final answer to the question of the existence of aluminum resinate as a compound awaits exploration of the subject by other means, possibly by x-ray studies.

The aging of alumina flocs precipitated from aluminum sulphate and aluminum chloride solutions by alkali produces small but significant changes in anion adsorption, hydrogen ion concentration, and electrophoretic velocity. Although the effects were not large, it was observed that on aging the electrophoretic velocity of acidic or positively charged alumina increased in the positive direction, whereas the alkaline

or negatively charged alumina became more negative. Both the negatively and positively charged flocs from aluminum sulphate adsorb sulphate ion from the solution, whereas the chloride ion concentration does not change with the age of the precipitate. It is worth repeating that the quantity of sulphate ion adsorbed depends upon the hydrogen ion concentration, whereas this is not a variable in the case of aluminum chloride. On aging, the pH of solutions containing negatively charged alumina increases, and that of positively charged alumina decreases. In other words, alkaline alumina becomes more alkaline and acidic alumina becomes more acidic. This partially agrees with the findings of Weiser *(3)*, who found that the pH of positively charged alumina sols decreased on aging in contrast to the work of Thomas and Whitehead *(4)* who found that the pH increased. The factors of anion adsorption and pH changes combined appear related to one another and to the change in the electrophoretic velocity of alumina particles.

The location of the isoelectric zone of alumina from aluminum sulphate around pH 7.5 and for alumina from aluminum chloride near pH 9.1 is to be compared with the values of 7.5 and 8.2, respectively, given by Larson *(16)*. The electrophoretic velocities of negatively charged alumina particles are somewhat irregular and less reproducible than those of the positively charged sols. The shift of the isoelectric zone toward the acid side and the lowering of the positive charge on alumina from alum may tentatively be said to be the result of adsorption of sulphate ions.

Any change in the hydrogen ion concentration of alumina systems results in an immediate change of the electrostatic charge on the floc. This may relate to occasional loss of sizing at near neutral conditions.

Sodium sulphate, when added in increasing quantities to alumina systems before precipitation, decreases the hydrogen ion concentration of the final systems and lowers the positive charge or increases the negative charge on the floc to an extent greater than would result from increase in alkalinity alone. For the system which contained enough sulphate ion to be equivalent to aluminum sulphate, the electrophoretic velocity coincided with the value for aluminum sulphate, another fact which substantiates the currently accepted ideas that anion concentration and valence are among the most important considerations in alumina flocculation.

The data for the electrophoretic behavior of sodium resinate and Prosize when precipitated by aluminum salts show how greatly the protein in Prosize has modified the rosin. Not only does Prosize require less alum to give a certain value of hydrogen ion concentration, but the positive character of the protein, as compared with the more negative character of rosin, has a marked effect in increasing the positive or reducing the negative electrostatic charge on the size micelles. One point of interest is the difference in size of the agglomerates and primary particles of the precipitated sizes. The stabilizing action of the protein in Prosize, assumed in the light of these observations to be a coating film on the rosin, inhibits the formation of the large particle agglomerates which appear in sodium resinate systems.

In a theoretical application of these materials—alum and sodium resinate, corresponding to ordinary size, or Prosize—to the papermaking system, it would be found that the protein-protected size would be the more desirable for the following reasons:

(a) A more uniform coating of size on the fibers due to smaller precipitated particle dimensions.

(b) Use of less alum for the necessary mordanting of the size onto the fiber surfaces.

Theoretically, it should be possible to mix the right proportions of size, pulp, and alum to give complete electrostatic neutralization of the components of the papermaking furnish and optimum sizing conditions. It is possible that a modified method of making electrophoretic measurements can be applied to the solution of this problem. At least, the amount of size and alum used can probably be reduced by more careful control and by the use of sizes, such as Prosize, which have a strongly positive character and which precipitate in the form of small agglomerates instead of large clumps.

In addition to the electrokinetic effect of alumina on size, the influence of hydrogen ion concentration is important. Prosize has approximately the same isoelectric point as alpha protein, whereas that of rosin is much lower. It can be said that the particle of Prosize does not behave electrophoretically as does rosin size, but rather in a manner resembling protein. In addition, Prosize particles precipitated by acid are small compared with those precipitated from ordinary sizes or sodium resinate. In the case of both sodium resinate and Prosize, the bivalent sulphate ion from sulphuric acid has its usual tendency to keep the precipitates in a more negatively charged condition than does the chloride ion.

In the light of the various phenomena observed, sizing acquires a complex practical and theoretical character. In all the explanations employed in this paper, cellulose is assumed to be a negatively charged substance at all hydrogen ion concentrations. This may not necessarily be the case, because rosin was previously assumed to be negatively charged and yet has been found to be positively charged, although not at papermaking hydrogen ion concentrations.

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Stain Reactions of Pulps Exposed to Ultraviolet Light*

By John H. Graff[1]

Abstract

Pulps have been exposed to ultraviolet light (sunlight and Sterilamp) for periods up to 192 hours, and their behavior to various stains studied.

The brightness of the groundwood and the softwood unbleached sulphite samples decreased considerably for the first 24 hours of exposure, a little less for the next 24-hour period, and considerably slower thereafter. For hardwood sulphite and coniferous kraft and soda, the brightness of the sheets gradually increased with the length of exposure.

The reactions of the C stain with the groundwood samples showed no appreciable amount of chemical pulp either by exposure to the Sterilamp or to sunlight even after 192 hours, nor did the Herzberg stain for the samples exposed to the Sterilamp; but for those exposed to sunlight, the reaction for chemical pulp with the Herzberg stain increased considerably with the relative time of exposure.

With the exception of the hardwood sulphite, the C stain did not give any reactions of bleached fibers on exposure of the chemical pulps to the Sterilamp or to sunlight, with the exception of 5% bleached fibers after 192 hours exposure to sunlight. With the Herzberg stain, the reaction of the chemical pulps was practically the same for exposure to the Sterilamp and to sunlight, and the most marked change occurred during the first 24 hours of exposure.

The Bright stain reactions with groundwood samples did not show any appreciable differences on exposure to light, except in the case of western spruce groundwood.

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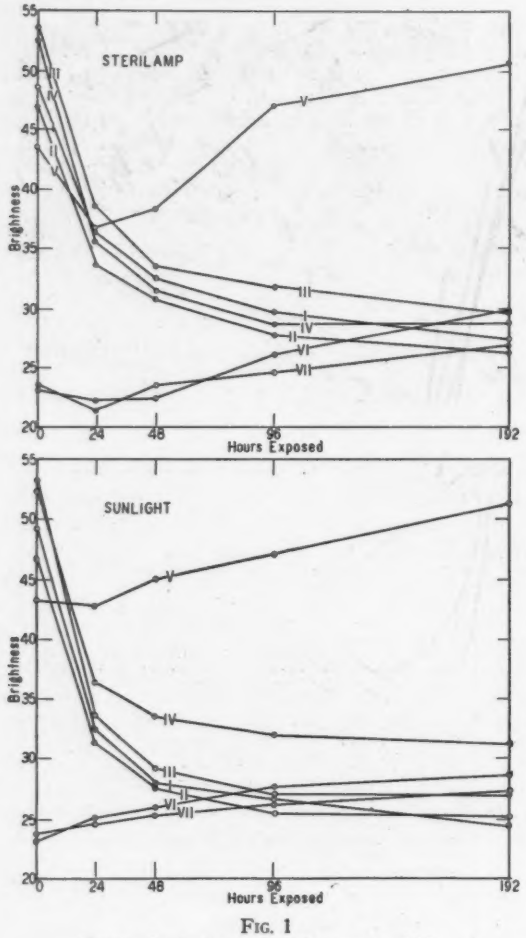

FIG. 1
Changes of Brightness by Exposure to Light

In previous work at the Institute on the fading of groundwood, it was found that, on exposure of groundwood to sunlight, the iodine stain used for fiber analysis gave reactions characteristic of chemical pulp. This was more noticeable with the Herzberg stain than with the C stain, and unbleached sulphite pulps tended to appear as bleached sulphite pulps. Staining the pulps with the Bright stain showed that lignin does not have to be removed to change the reactions, for modification of lignin by light has the same effect.

Because of these findings, work was undertaken to obtain a clearer understanding of the effect of light with a high intensity in the ultraviolet on the staining reactions of different types of pulps exposed for different lengths of time.

Handsheets, as thin as possible, were made from the pulps listed in Table I. They were exposed in the Sterilamp and to strong summer sunlight for periods of 24, 48, 96, and 192 hours on each side. The Sterilamp, which operated at a line voltage of 3000, gave about 80% of its radiation at 2537 A. The exposure to sunlight was carried out during the periods of clear days as shown in Table II.

TABLE I.—PULP SHEETS USED FOR FADING AND STAIN EXPERIMENTS

	$KMnO_4$ No.	Caliper, Inch	Basis Weight (25x40—500)
I. Groundwood (midwestern)	...	0.0041	20.8
II. Groundwood (western hemlock)	...	0.0035	16.6
III. Groundwood (western spruce)	...	0.0028	16.8
IV. Unbleached sulphite (spruce)	21.9	0.0024	18.9
V. Unbleached sulphite (basswood)	18.0	0.0021	11.4
VI. Unbleached kraft (loblolly pine)	28.9	0.0025	13.2
VII. Unbleached soda (jack pine)	31.6	0.0022	11.9

TABLE II.—PERIODS OF THE EXPOSURE TO SUNLIGHT

24 hours exposure on each side	July 1 to July 12
48 hours exposure on each side	July 1 to July 23
96 hours exposure on each side	July 1 to August 20
192 hours exposure on each side	July 1 to October 16

The brightness of the handsheets was determined before and after exposures, fiber analyses were made both with the C stain and with the Herzberg stain, and the total percentage of cook was determined with the Bright stain.

The curves in Fig. 1 show that the brightness, both for groundwood and unbleached spruce sulphite, decreases considerably for the first 24 hours, both for the Sterilamp and for sunlight, much less for the next 24 hours, and relatively very slowly on further exposure.

The brightness of the hardwood sulphite decreases during the first 24 hours, but after that it increases; the coniferous unbleached kraft and soda pulps show a small gradual increase in brightness.

That the changes in brightness are practically the same, regardless of which light is used, is shown in Table III.

TABLE III.—POINT CHANGES IN BRIGHTNESS AFTER 192 HOURS' EXPOSURE

	Sterilamp	Sunlight
I. Groundwood (midwestern)	—21.0	—24.2
II. Groundwood (western hemlock)	—20.6	—21.6
III. Groundwood (western spruce)	—23.7	—26.6
IV. Unbleached sulphite (spruce)	—23.5	—21.0
V. Unbleached sulphite (basswood)	7.5	8.0
VI. Unbleached kraft (loblolly pine)	6.7	5.7
VII. Unbleached soda (jack pine)	3.1	3.3

It was found that disintegration of the pulps became more difficult the longer they were exposed to light which, usually, was greater on exposure to sunlight than in the Sterilamp. This is illustrated in Fig. 2.

The C Stain and Herzberg Stain Reactions

Groundwood

Table IV shows that there was a very small indication of chemical pulp with the C stain, even after 192 hours' exposure to the Sterilamp, and after the same exposure to sunlight only 2 or 3% gave a reaction for chemical pulp.

The Herzberg stain shows traces of chemical pulp after an exposure of only 24 hours to light. However, it is important to note, as shown in Table IV and Fig. 3, that after 192 hours of exposure to the Sterilamp, the maximum chemical pulp reaction with this stain was only about 3%, whereas, on exposure to sunlight for the same period, this increased to 72%.

Another interesting point is the relationship of the maximum chemical pulp reactions for the different groundwood pulps—72, 54, and 37% chemical pulp for midwestern, western spruce, and western hemlock, respectively.

Chemical Pulps

With the C stain it is relatively easy to differentiate between raw-cooked, medium-cooked, well-cooked, and bleached fibers, but with the Herzberg

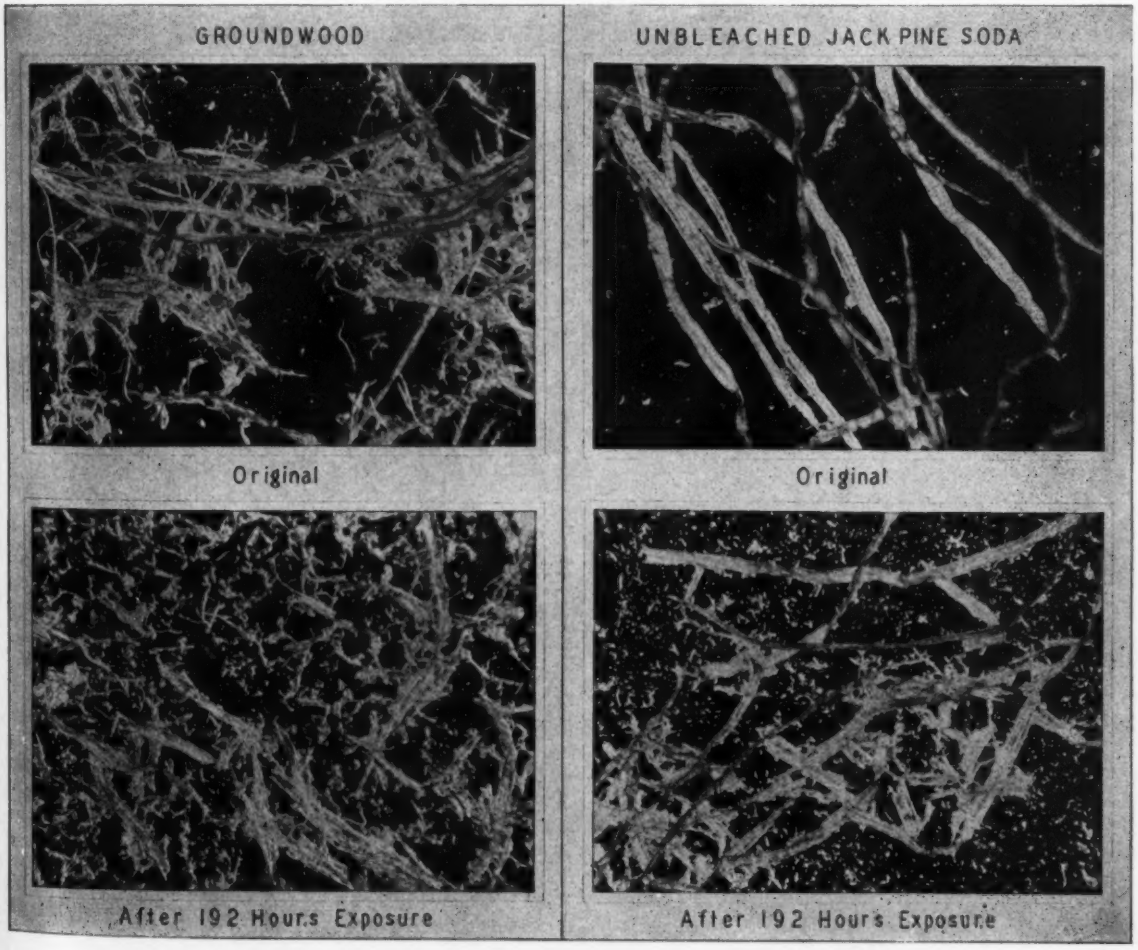

Fig. 2

Increase of Fiber Fragments by Disintegration of Samples Exposed to Light

stain these differences are small. However, since unbleached pulp has different percentages of raw, medium, and well-cooked fibers, it is necessary for the purpose of determining the relative purity of a pulp mixture, not only to count the number of unbleached and bleached fibers, but to find a common denominator—the percentages of total purity—for a mixture of raw, medium, well-cooked, and bleached fibers.

TABLE IV.—SUMMARY OF GROUNDWOOD DATA

Hours Exposed	Brightness	Chemical Pulp, % C Stain	Chemical Pulp, % Herzberg Stain	Total Percentage Cook
	I. Groundwood (midwestern)			
	Sterilamp			
0	48.4	..	..	15.5
24	36.3	..	..	13.6
48	32.3	..	..	13.3
96	29.7	..	..	13.3
192	27.4	..	3	11.8
	Sunlight			
0	48.4	..	..	15.5
24	32.5	..	..	12.8
48	28.0	..	..	15.1
96	25.2	..	12	12.4
192	24.3	3	72	16.6
	II. Groundwood (western hemlock)			
	Sterilamp			
0	46.8	..	..	15.0
24	33.5	..	..	14.8
48	30.5	..	..	11.8
96	27.7	..	1	14.0
192	26.1	..	2	12.0
	Sunlight			
0	46.8	..	..	15.0
24	31.4	..	4	15.2
48	27.7	..	4	13.4
96	25.5	..	7	11.8
192	25.3	2	37	16.8
	III. Groundwood (western spruce)			
	Sterilamp			
0	53.4	..	..	23.4
24	38.4	..	..	25.6
48	33.3	..	..	16.7
96	31.8	..	1	23.4
192	29.7	..	1	14.1
	Sunlight			
0	53.4	..	..	23.4
24	33.7	..	3	15.7
48	29.0	..	4	33.2
96	27.0	..	10	15.6
192	27.2	..	54	15.5

This can be done by giving arbitrary purity values to the different groups: for example, 10% for raw fibers, 40% for medium-cooked, 70% for well-cooked, and 100% for bleached fibers, and the percentage of total purity calculated as shown by the example in Table V.

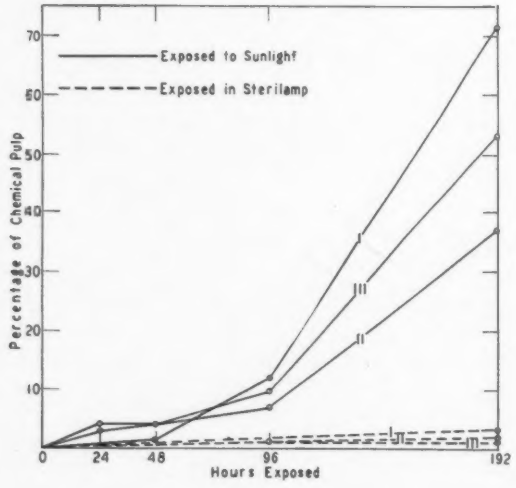

FIG. 3

Chemical Pulp Reaction of Groundwood with the Herzberg Stain

TABLE V.—CALCULATION OF PERCENTAGE TOTAL PURITY OF PULP

a = Relative Value, %; *b* = Percentage by no.

	a	*b*	*ab*/100
Raw	10	8	0.80
Medium-cooked	40	40	16.00
Well-cooked	70	40	28.00
Bleached	100	12	12.00
Percentage of total purity			56.80

Table VI shows the relative percentage of total purity and the percentage of bleached fibers in each pulp, as determined both by the C stain and by the Herzberg stain, after the different times of exposure to light; the curves in Fig. 4 show the percentages of total purity of these pulps at the different times of exposure to the Sterilamp and to sunlight. However, it must be remembered that it is very difficult, with the Herzberg stain, to differentiate between the various degrees of cooking and between unbleached and bleached fibers and, therefore, the data in Table VI can be considered as showing only general trends, although there is a fair agreement between the purity curves as determined by the two stains.

TABLE VI.—SUMMARY OF CHEMICAL PULP DATA

Hours Exposed	Brightness	Bleached Pulp, % C Stain	Bleached Pulp, % Herzberg Stain	Total Purity, % C Stain	Total Purity, % Herzberg Stain	Total Cook %
	IV. Unbleached Sulphite (spruce)					
	Sterilamp					
0	52.3	..	..	10.0	29.8	13.4
24	35.4	..	..	32.1	31.9	14.4
48	31.4	..	2	38.8	49.9	14.0
96	28.6	..	7	42.4	52.6	56.7
192	28.8	..	5	47.2	58.9	43.9
	Sunlight					
0	52.3	..	..	10.0	29.8	13.4
24	36.4	..	3	34.9	46.9	12.8
48	33.7	..	5	41.5	54.1	44.9
96	32.1	..	7	48.7	56.5	44.0
192	31.4	5	12	54.1	56.8	69.2
	V. Unbleached Sulphite (basswood)					
	Sterilamp					
0	43.4	..	..	10.0	35.5	42.6
24	36.5	85	7	91.6	58.3	75.6
48	38.1	91	18	96.1	63.1	73.0
96	46.9	95	21	98.0	64.6	92.2
192	50.1	98	50	99.4	77.5	84.7
	Sunlight					
0	43.4	..	..	10.0	35.5	42.6
24	43.1	73	8	87.1	58.9	62.9
48	45.1	92	15	96.1	61.9	95.9
96	47.3	96	20	98.8	65.5	82.3
192	51.4	98	60	99.4	72.0	98.1
	VI. Unbleached Kraft (loblolly pine)					
	Sterilamp					
0	23.0	..	..	10.0	58.3	14.5
24	22.2	..	49	28.3	84.7	17.5
48	22.4	..	48	31.6	84.4	15.6
96	26.1	..	71	36.1	91.3	29.9
192	29.8	..	62	48.4	88.6	17.4
	Sunlight					
0	23.0	..	..	10.0	58.3	14.5
24	25.1	..	46	31.0	83.8	13.9
48	25.8	..	63	33.1	88.9	33.6
96	27.7	..	69	40.4	90.7	34.5
192	28.7	..	57	49.0	87.1	60.8
	VII. Unbleached Soda (jack pine)					
	Sterilamp					
0	23.7	..	..	10.0	61.3	11.8
24	21.4	..	11	20.8	70.9	17.7
48	23.5	..	5	25.3	69.7	14.9
96	24.5	..	31	37.9	76.0	37.9
192	26.8	..	35	31.6	75.7	17.8
	Sunlight					
0	23.7	..	..	10.0	61.3	11.8
24	24.7	..	21	22.9	73.9	54.4
48	25.3	..	29	29.2	76.0	51.8
96	26.1	..	37	31.3	77.2	29.0
192	27.0	..	36	27.7	78.1	51.5

Table VI shows that the only pulp in which change from raw unbleached to bleached fibers occurred to any considerable extent with the C stain was the hardwood unbleached sulphite, in which case, even after only 24 hours' exposure, the stain reaction showed 85 and 73% bleached pulp in the Sterilamp and in sunlight, respectively.

Table VI and the curves in Fig. 4 show that there

are no practical differences between the Sterilamp and sunlight exposures regarding the reactions of these two iodine stains, and that the major part of the change in the stain reactions occurs during the first 24 hours for both types of light.

Bright Stain Reactions

The Bright stain consists of a solution of ferric chloride and potassium cyanide in water and one of Benzopurpurin 4B in alcohol. The fibers are treated with the first solution, washed with water and then treated with the second solution. The aqueous solution gives varying depths of a blue color with the fibers, depending upon the lignin content and probably the oxycellulose content, whereas the dye solution stains the cellulose varying degrees of red.

The total percentage of cook of the fibers is determined by the relative proportion of blue, gray-blue, blue-red, red-blue, and red fibers in the pulp.

Table IV and Fig. 5 show the total percentage of cook for the groundwood, and Table VI and Fig. 5, the total percentage of cook for the chemical pulps.

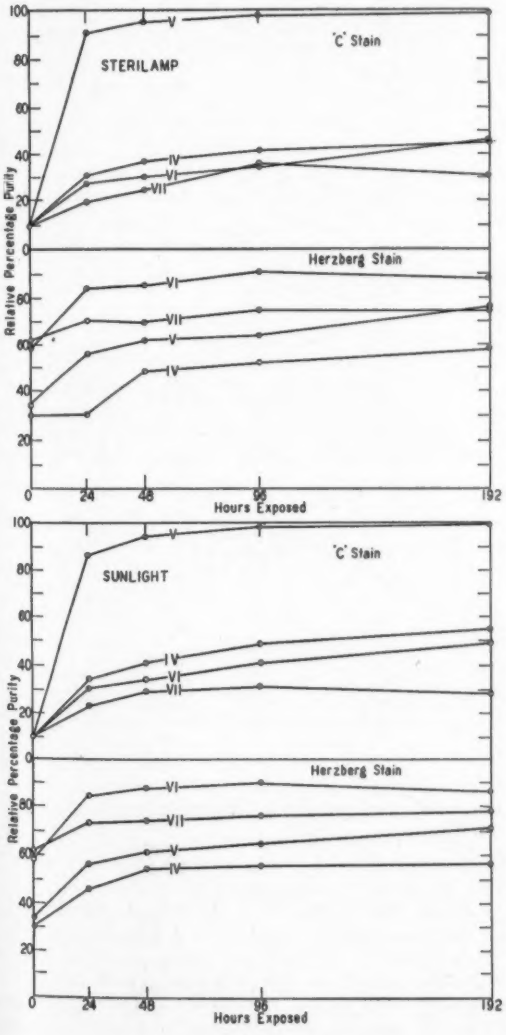

Fig. 4

Relative Percentage Purity of Unbleached Pulps Exposed to Light

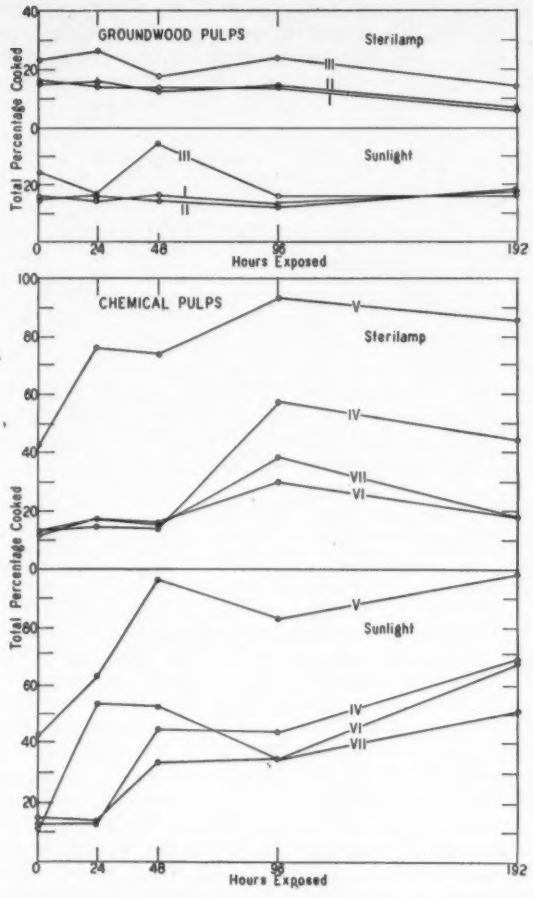

Fig. 5

Percentage Cooked as Determined with the Bright Stain

There is practically no change on exposure to ultraviolet light for midwestern and western hemlock groundwood, but that from western spruce shows some interesting reactions. The original sample has a relatively high percentage of total cook (this is a calculated value, derived from the number of fibers variously stained by the reagent), indicating that it has a large number of fibers which are stained blue-red and red-blue. The number of these fibers decreased during the first 24 hours in sunlight, rose during the next period of exposure, and thereafter decreased again.

The blue-red and red-blue colored fibers in the original pulp probably occur because, in sprucewood, some of the lignin may be removed during the grinding process. The fall and rise and eventual decline in the total percentage of cook, however, is difficult to explain, except that it may be related to oxidation.

The curves in Fig. 5 show that, when the chemical pulps are exposed to the Sterilamp, the total percentage of cook increases up to 96-hour exposure and then gradually decreases, but when exposed to sunlight, these values gradually increase up to 192 hours of exposure.

Fluorescence Reactions

The fluorescence colors of the original samples

and the samples exposed at different lengths of time in the Sterilamp and to sunlight, were determined under a filtered ultravoilet light. Although we have little data to guide us in what should be expected, we know that unfaded pulps show different fluorescence colors depending upon the method of pulping, and these colors again vary according to the relative degree of cooking and purification. From the fluorescence colors obtained with the exposed pulps it is of interest to note that for the groundwoods and the coniferous kraft and soda pulps the original colors changed to a dark yellowish-brown during the first 24 hours of exposure and, as the exposure increased, the fluorescence colors became lighter and more yellow. For the sulphites, softwood and hardwood, the colors were very light yellow even after the first 24 hours of exposure to light, and for all the samples, the fluorescence color reactions were much faster for those exposed to sunlight for the first 24 hours than for those exposed in the Sterilamp.

Discussion

The type of light used for fading—i.e., the Sterilamp or strong sunlight—has no effect on the final values of relative brightness, the stain reactions of the C stain and Herzberg stain on chemical pulps, and the reaction of the Bright stain. The changes in the brightness, and iodine stain reactions are greatest during the first 24 hours of exposure; the effect on the reaction of the Bright stain was more gradual.

The C stain shows practically no reaction of chemical pulp in the exposed groundwood samples and should, therefore, give no trouble, except where, by very long exposures to sunlight, the resulting broken fibers, fiber fragments, and fibrils should be misleading. The C stain gives no indication of bleached fibers in exposed unbleached chemical pulps when the original pulps did not have a low permanganate number, except in the case of hardwood sulphite; but with well-cooked chemical pulps, bleached fibers probably would be found after prolonged exposures.

The reaction of the Herzberg stain with the exposed groundwood samples shows that the effect of sunlight on these samples is quite different from that of the Sterilamp; 192 hours of exposure produced a maximum of 3% of chemical pulp reaction as against 72% for exposure to sunlight. The curves in Fig. 3 suggest that the resistance to the reaction of sunlight also depends upon the kind of wood from which the groundwood is prepared, because in this experiment western hemlock groundwood gave only 37% chemical pulp reaction. This, together with the fact that the changes of the fluorescence colors by fading is much stronger for the sunlight exposures than for the exposures in the Sterilamp, indicates that, so far as the groundwood is concerned, the reaction of sunlight has an entirely different effect than the reaction of the Sterilamp. This may be due, in part, to heat generated by the sunlight, the relative moisture in the air, or a combination of both.

The C stain reaction with the hardwood unbleached sulphite, showing between 73 and 85% bleached fibers after the first 24 hours of exposure to the Sterilamp and to sunlight, indicates that the lignin in this wood is of entirely different character than the lignin in the coniferous woods.

The reaction of the Bright stain on the chemical pulp exposed for different intervals to the two light sources, shows that the lignin present in these pulps is modified by the exposure to light in such a way that the total percentage of cook, as determined by this stain, increases in the same way as if the pulps had been cooked to a lower permanganate number; the reaction of the western spruce groundwood with this stain indicates that some of the lignin probably has been removed during the grinding process, and that the cellulose in these fibers, by continuous exposure to light, is oxidized and, therefore, gives an increased blue color reaction with this stain.

These results show that fiber analysis of aged papers, which have been exposed to daylight for a considerable period, must be done with the utmost care to avoid over-estimation of chemical pulps in a groundwood sheet or of bleached fiber in a mixture of unbleached and bleached pulp furnishes.

Slime Control in Paper Mills*

By J. A. Holmes[1]

Abstract

The successful control of slime depends on the identification of the organisms to be controlled, correct choice of treatment, proper determination of the points of application, continuous supervision to check the regularity of addition of treatment and the maintenance of the equipment, and general cleanliness throughout the plant.

The control of slime in paper mills has become increasingly important in recent years and many studies of this problem have been made, resulting in an increase in knowledge of the subject. This article deals more with the practical side in an attempt to clarify the process of slime formation and elimination. Moldproofing differs somewhat from slime control and is not covered in this presentation.

Types of Organisms

Slime is composed of certain types of organisms which vary greatly in their characteristics. In addition to slime organisms, there are present others that do not cause slime but which increase the count in the white water, stock, or finished paper. We will deal here with only the slime producers. They are divided into three general groups: (1) Coliform organisms and other nonspore-bearing slime bacteria; (2) spore-bearing bacteria; and (3) fungi, yeasts, and pseudo yeasts.

The coliform and other nonspore-bearing bacteria

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form very voluminous slimes. These types grow very rapidly, but are susceptible to most chemical treatments or heat, and are eliminated from paper by the drier rolls. They are most common in groundwood and paperboard mills. Most of them find their way into the mill with the water supply. The most common types are *Aerobacter aerogenes, Aerobacter cloacae, Escherichia coli, Achromobacter,* and *Flavobacterium* species. The members of the genus *Actinomyces,* filamentous, mold-like bacterial species, are sometimes considered as fungus types.

The spore-forming bacteria form tough, ropy slimes and are more resistant to chemicals and heat than the former group. At the earliest stage of development, these organisms are the least resistant, and, by finding their source, chemical treatment can be used to control growth. They are most common inbleached sulphite mills, but also are found in rag, board, and groundwood.

The better known include the *B. subtiles* group, the *B. Mesentericus-B. vulgatus* group, *B. megartherium,* and *B. mycoides.*

Fungi are somewhat different from bacteria having more complex structures and forming tangled or matted threads. Some are slime formers, others form slime in association with bacteria, others do not form slime but destroy and discolor cellulose fibers or cause odors, and others have several or all of these characteristics. Fungi are resistant to heat and as a class cannot be treated with any one chemical. Since they vary so greatly in their characteristics, it is necessary to treat each type individually with the chemical to which it is most susceptible because otherwise if a mill is confined to one chemical a very heavy dosage is needed or sufficient to control the most resistant strain.

Some of the more common groups are *Oidium, Trichoderma, Aspergillus, Cladosporium, Penicillium,* and *Monilia.*

Yeasts or yeast-like fungi are encountered most frequently in groundwood mills, although they may be found in any plant. They are often the source of pink slime. In many ways the yeast organisms, such as Torulae, resemble the fungi in their reactions and appearance as slime, but from experience react more like bacteria in their susceptibility to certain chemical treatments.

In checking 189 different slime samples, only 30 were reported to be of practically pure strains and 22 of the latter were accompanied by samples of slime from other parts of the mills that had additional kinds of organisms. The following table shows the frequency that the more common organisms were encountered in slime.

FREQUENCY OF APPEARANCE, %	
Aerobacter aerogenes	55
Achromobacter sp.	16
Escherichia coli	12
Actinomyces sp.	10
B. peptogenes	20
Other spore-formers	19
Oidium sp.	38
Aspergillus sp.	29
Trichoderma sp.	24
Penicillium sp.	21
Torulae sp.	5

In checking slime spots from samples of freshly made paper or paperboard, only one contained any nonspore forming organisms, these evidently having been eliminated at the drier rolls. The spots were either spore-bearers or fungi, or both. However, laps or scrap paper almost always contained ordinary bacteria as well as spore-formers and fungi.

It must be remembered in a paper mill system, the flora may change constantly with the variation of the seasons, types of pulp, water conditions, or for no apparent reason. Fortunately, if watched fairly closely, any such changes can be anticipated—especially after a plant has had a year or more experience with some particular treatment, and, from this experience, knows what to do as regard changes in treatment.

Control of Organisms

The most common terms used for controlling organisms are killing and inhibiting. A certain amount of chemicals may actually kill off bacteria while a lower dosage will inhibit or prevent their growth or multiplication. The killing dosage may be rather high as compared with the inhibiting dose. In paper mill work, inhibiting dosages are used almost exclusively because with most chemicals it would be impractical and uneconomical to use a killing dosage. The fact that only inhibiting dosages are used is one of the most important things to remember in slime control. If the organisms are treated just sufficiently to stop their growth, those present are gradually carried off with the paper and plant effluent. However, they are seldom entirely eliminated from the system. If treatment is reduced too far or is stopped, the inhibited or suppressed organisms come to life and start slime formation. Old slime may be eliminated because no new is forming and the old gradually dies a natural death. Because of this condition and because of continuous contamination by organisms from air, water, and pulp, it is impractical to completely sterilize a paper mill system. This might be compared to a normal healthy being who may detain certain organisms in the mouth, nose, throat, or internally which are capable of causing disease but which are kept in control by proper diet and living or various medicines. Likewise in a paper mill, there are always some organisms just waiting for a chance to grow and produce slime. They have everything naturally to their advantage for growth in a mill system, such as food, temperature, and rough surfaces or protected spots, such as corners, pipe-line dead ends, or storage chests and vats. This means that plant officials and operators must be diligent in watching a plant to eliminate all sources of slime by good housekeeping, elimination of all possible sources of pulp decomposition, or other cause bacteria or fungi growth. Paper mills can be compared to the human body in that cleanliness of the system and its surroundings greatly benefits or may even supplant any medical treatment.

Another point that must be watched is the elimination of slime pockets or colonizing. The most common sources of slime organism growth are in slime pockets, such as dead ends of pipe lines, corners of infrequently cleaned chests, or storage tanks, stored wet pulp, or any place where there is a chance for pulp decomposition. Such condition can be compared to a boil which is a localized infection that contaminates the whole body. In paper mills, a slime pocket may be a beater, chest, or white water tank yet the slime will show up at an entirely different place, such as a cylinder vat or machine headbox. The spots can be found by a bacteriological survey of the entire system or by the more common method

of just looking for them and cleaning or streamlining to prevent their recurrence.

Chemical Treatments

The most widely known chemical treatment in the past has been chlorine with or without ammonia. Under certain conditions—especially in the fresh water supply or with open system—it works very well. Chlorine in too large quantities is corrosive. Organic matter consumes chlorine so that in closed systems abnormal dosages may be necessary to obtain any residual. Ammonia sets chlorine as a chloramine which is more stable; however, ammonia is very corrosive to copper wires and screens.

The nonspore-forming group of organisms are much more susceptible to chlorine than are the spore-forming bacteria and fungus groups. Some mills use chlorine to kill off the bulk of the bacterial slime and then finish off with other treatments, such as the chlorophenols for the spore-forming bacteria and fungi.

Copper sulphate is used mostly for the various types of fungi. Continuous use of copper sulphate may cause corrosion—especially when the total solids of the white water is low. The best use of copper sulphate is in strong solutions for cleaning equipment, tanks, or pipe lines. The longer the contact period the better, and circulation of the solution is highly desirable. Sometimes walls of tanks, chests, etc., are simply painted with a strong copper sulphate solution.

Mercury compounds have and are being used successfully, although they are rather expensive. Certain of these compounds have killing and inhibiting power with small dosages, sometimes only a few parts per billion being necessary; however, a bad feature is that too small dosages will cause stimulation of the growth of organisms, thus being worse than no treatment at all. They should only be used under exact and well controlled conditions.

Chlorophenates are a combination of chlorine and phenol usually furnished as the sodium salt. The biggest advantage of the chlorophenates is that they are not used up by the organic matter in the white water as is chlorine, but tend to concentrate and remain in the system.

Sodium pentachlorophenate has been used rather extensively, and is best for the spore-formers and certain of the fungi. Its reactions are slower than chlorine and, consequently, requires more contact time so that it is more suitable in a closed system where the treatment can remain in contact with the organisms for a longer time.

Pentachlorophenol, the acid form of the pentachlorophenate, is rather insoluble and sometimes this is of advantage when it is desired to retain the chemical in paper for moldproofing. By adding the pentachlorophenate at the beater, acidity causes its precipitation into the fibers for retention in the sheet. However, in slime control, this condition is highly undesirable because it is necessary to keep and build up the slime-preventing chemicals in the system, and, consequently, must be added to the chlorophenol to make it soluble and to stabilize it so that it carries through the beaters and other equipment in such manner that a portion can remain and concentrate in the white water. In most cases good elimination of mold or fungi organisms from the system by correct slime treatment so reduces the mold count in the finished paper that no direct mold treatment is needed.

Sodium tetrachlorophenate has greater inhibiting properties for fungi in general and about the same for bacteria as the pentachlorophenate. 2-chlorophenolphenate is better for the nonspore formers and yeasts than either tetra- or pentachlorophenate.

Choice of the use of these different chlorophenates depends on identification of the organisms encountered or slime analysis. The type of mill and the stock used help determine the type of chemical to use.

Methods of Application of Treatment

One of the most important features of slime control is to find the sources of contamination by the various organisms. This may be in the water or pulp supply or within the mill itself. A bacteriological survey made by making analysis at various spots in the mill is one sure way to find out where treatments should be best applied. However, the necessary technical men and equipment are not always available, and the next best method is to go by experience and visual examination and inspection of the mill in question. It is impossible to give the exact location to apply various treatments for each class of mill because each mill has its own peculiarities. However, general rules can be followed, which are a great help in starting. It must be remembered that even though a system is tightly closed and water is used over and over again that the best point of application of any treatment is always nearest the point of maximum contamination by the various slime organisms. In many mills this may be at several points requiring a feeding of treatment at these several spots.

Fresh water can be treated with chlorine because there is usually insufficient organic material to use up much of the chemical, and, since chlorine is so rapid reacting, most of the nonspore organisms may actually be killed before entering the mill. However, most of the spore-forming bacteria and fungi will not necessarily be killed by this treatment. Copper sulphate is beneficial in fresh water especially if there are basins or filters in which algae may collect.

The chlorophenols are sometimes added to the fresh water supply specially at rag mills where that one location is frequently sufficient, although, if the water supply is fairly sterile, then the beaters are the best point of application. In paperboard mills, the chlorophenols are added at the breaker beaters and at or near the machine. In sulphite pulp mills some experimentation may be necessary to find out whether the treatment should be added ahead of knotters, rifflers, and/or screens in the white water or in all these places. Sulphite mills should check the washing of the pulp because incomplete washing sometimes greatly increases growth of slime organisms. The use of electrical conductivity equipment to check the wash water and reduce solids to below a certain concentration helps greatly to eliminate this condition.

For mills making specialties, tissue, bond, etc., the treatment is divided between the beater and at the fan pump or headbox according to type of stock used. The more nearly sterile the stock, the less treatment is used at the beaters and the more at the machine.

A Study of Bleachability Methods*

By G. D. Knight[1] and B. L. Browning[2]

Abstract

The permanganate number, chlorine number, and hypochlorite bleach consumption tests have been compared in application to a sulphite pulp extracted with a number of solvents. The consumption of bleaching agent is shown to be closely related to the brightness of the pulp after treatment. Improved correlations of bleachability methods may be obtained by expressing all results as percentage chlorine, and further by carrying out the bleachability tests in such a way that a specified final brightness is obtained.

Of the several reagents used for determining the reducing characteristics of unbleached pulp, potassium permanganate, chlorine, and calcium hypochlorite are the most commonly employed. Numerous methods have been proposed for the application of these reagents. In the permanganate test, the time required for a given amount of pulp to decolorize a definite amount of reagent under specified conditions is observed or the amount of reagent consumed in a definite time is measured. Chlorine consumption is measured by the volume of gas absorbed or by the amount unused from a chlorine-water solution. In hypochlorite methods, the pulp is bleached with hypochlorite solution to a standard whiteness, or an excess of hypochlorite is added and the amount consumed determined.

The correlation of the values given by these methods with each other has been wholly empirical in the past, and numerous arbitrary relationships have been established. However, these relationships are not exact except for pulps of similar character and they give no fundamental information regarding the types of reaction involved. Lignin is usually considered the significant coloring matter present which reacts with the oxidizing solutions used for bleaching. Numerous workers *(1 to 4, 7, 9)*, however, have shown that a large part of the chlorine and permanganate consumption of pulps is caused by nonlignin components.

The present work was undertaken to obtain additional information on the effects of conditions of analysis and specific reagents on the reducing materials in pulps, in an attempt to provide the basis for an improved correlation of the various bleachability methods.

Materials

An unbleached Scandinavian sulphite, a west coast sulphite, a Canadian sulphate, and a domestic hardwood soda pulp were used. The pulps were shredded in a Gösta Hall disintegrator before use.

Extractions

Separate portions of the Scandinavian sulphite pulp were extracted with various solvents in order to obtain a series of pulps from which certain groups of constituents had been removed. Portions were extracted in a Soxhlet extractor with ether for 8 hours, with acetone for 10 hours, with ether and alcohol for 8 and 10 hours, respectively, and with alcohol-benzene for 10 hours. Extractions with hot water and 1% hydrochloric acid were carried out in a boiling water bath for 3 and 4 hours respectively. One per cent sodium hydroxide extraction was made according to TAPPI Standard T 212 m-40 and the 17.5% sodium hydroxide extraction by the TAPPI Standard (Alpha-cellulose Method) T 203 m-40.

Analytical Methods

Permanganate numbers

The values on the original and extracted pulps were determined according to TAPPI Standard T 214 m-37. The sample weight in all cases was equivalent to one gram of moisture-free, unextracted pulp. In bleaching to various degrees of brightness with permanganate, the same method was used except that the time of reaction was varied; ½, 1, 2, 4, 8, 16, and 32 minutes were used to obtain a series of permanganate numbers for each pulp.

Bleach consumption of pulps

The method of Koon *(6)* was used, except that 5-gram samples were taken.

Roe chlorine numbers

The Johansson modification *(5)* of the Roe-Genberg method was used. Improved reproducibility was obtained by steaming the samples as required, closing the flask tightly with a rubber stopper, and allowing the moist pulp to stand 24 to 48 hours.

Chlorine-water numbers

The following method of using a solution of chlorine water was employed to obtain a chlorine number for each of the pulps.

Preparation of the solution

One liter of distilled water at room temperature was saturated with chlorine gas. This solution was diluted to two liters to give a half-saturated solution and 100 cc. of 0.1 *N* hydrochloric acid were added. The resulting chlorine-water-hydrochloric acid solution was stored in a constant temperature water bath at 20 deg. C.

Standardization

Twenty-five cc. of the chlorine water were pipetted into an Erlenmeyer flask containing 500 cc. of distilled water and 5 cc. of *N* potassium iodine. The liberated iodine was titrated with standard sodium thiosulphate solution using starch indicator. The hydrochloric acid was determined by titration with standard sodium hydroxide, using methyl red indicator after the thiosulphate titration was completed.

Procedure

The weighed sample—between one and two grams—was placed in a 250-cc. Erlenmeyer flask and 100 cc. of distilled water at 20 deg. C. added. The pulp was completely disintegrated by shaking the flask.

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A portion of a thesis submitted by Mr. Knight in partial fulfillment of the requirements of The Institute of Paper Chemistry for the degree of Master of Science from Lawrence College, Appleton, Wis., June, 1941.
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Fifty cc. of the standard chlorine water were pipetted into the suspension while the flask was gently shaken to insure uniform distribution of the chlorine. The flask was then tightly stoppered and placed in a water bath at 20 deg. C. and the shaking continued for 2 minutes. The reaction was allowed to continue exactly 15 minutes from the beginning of the addition of the chlorine water; then 7 cc. of *N* potassium iodide were poured in quickly and the flask was shaken vigorously. The contents were washed into a 1-liter Erlenmeyer flask and diluted to 500 cc. The liberated iodine and the acid present were titrated with standard sodium thiosulphate and sodium hydroxide in the same manner as in the standardization of the chlorine-water solution. The amount of chlorine in the final solution, subtracted from the amount added, gave the grams of chlorine consumed by the sample, and the weight of acid added, subtracted from the final weight of the acid found, gave the grams of hydrochloric acid formed by the reaction. Results were calculated to grams of chlorine and grams of hydrochloric acid per 100 grams of moisture-free, unextracted pulp.

Permanganate numbers and chlorine-water numbers of extracts

Weighed samples of the unextracted pulp were extracted with the solvent, and the resulting solution was neutralized to the methyl red end point. This solution was then treated exactly as in the permanganate number and chlorine-water number procedures. For determination of the permanganate and chlorine-water numbers of lignin from the various pulps, the lignin was isolated by the 72% sulphuric acid method *(8)*, washed, suspended in distilled water, and subjected to the tests.

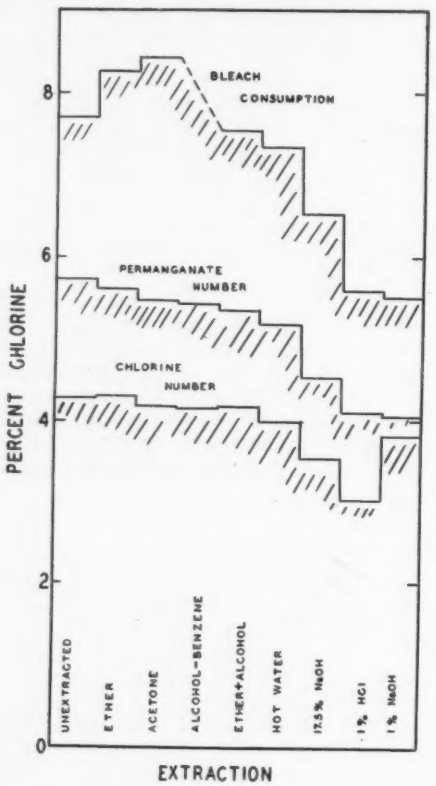

Fig. 1
Effect of Various Extractions on the Bleach Consumption, Permanganate Numbers and Chlorine Numbers of a Scandinavian Sulphite Pulp

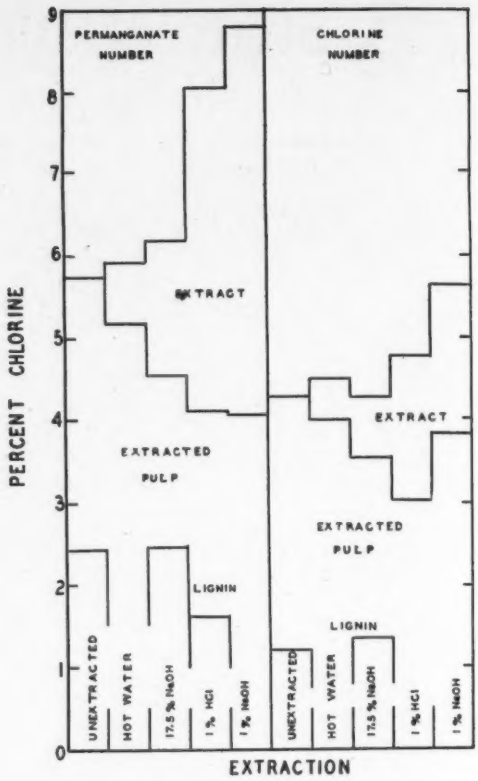

Fig. 2
Permanganate and Chlorine Numbers of Extracted Scandinavian Sulphite Pulp and Pulp Extracts

The determinations of brightness were made on the General Electric reflection meter (brightness tester). After the permanganate-number tests were completed, the pulp suspensions were filtered on filter paper in a Büchner funnel and thoroughly washed with water. The bleach consumption sheets were made in the same way in order that all brightness measurements could be made on sheets of equivalent character. The pulp suspensions from the chlorine-water number determination were extracted with cold sodium hydroxide and thoroughly washed before being made into sheets. The data from which Figs. 1, 4, and 5 were derived were determined on handsheets prepared on a British sheet mold.

Effect of Extractions

Each of the pulp samples obtained by extraction of the Scandinavian sulphite pulp was treated to determine its permanganate number, Roe chlorine number, chlorine-water number, amount of hydrochloric acid formed during treatment with chlorine water, and bleach consumption. The data observed and derived are given in Table I.

The chlorine-water method, even though the reagent is in a dilute acid solution, was found to give substantially the same values as the Roe chlorine gas method. The former procedure is considered preferable because it gives more reproducible results. It is also probable that the determination of the hydrochloric acid formed during the reaction may be of value in obtaining certain chemical characteristics

of the pulp. The amount of acid formed depends upon the nature of reaction—thus, normally, chlorine reacting by addition yields no hydrochloric acid, reacting by substitution yields one half the chlorine as hydrochloric acid, and reacting by oxidation appears completely as hydrochloric acid.

All extractive procedures lower the permanganate number, all with the exception of ether lower the chlorine number, and all except ether and acetone lower the bleach consumption. Some of the pitchy constituents appear to consume permanganate, but not chlorine or hypochlorite. These relations are shown in Fig. 1.

The bleach consumption is higher than the permanganate number, and the latter in turn is higher than the chlorine-water number, when all are expressed on the basis of percentage chlorine. The ratios of these values for the variously extracted pulps are approximately the same. The chlorine numbers for bleach requirement calculated from conversion data given in TAPPI Standard (Permanganate Number Method) T 214 m-37 are in fairly good agreement with the corresponding bleach consumption determinations.

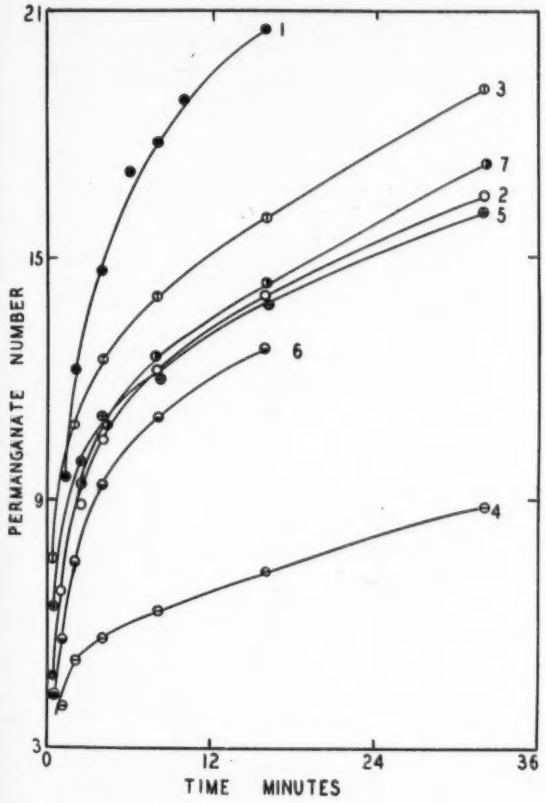

FIG. 3

Effect of Time of Reaction on Permanganate Number of Pulps. 1. Scandinavian Sulphite. 2. West Coast Sulphite. 3. Sulphate Pulp. 4. Soda Pulp. 5. Sulphate Pulp Extracted with 1% Hydrochloric Acid. 6. Scandinavian Sulphite Pulp Extracted with 1% Hydrochloric Acid. 7. Scandinavian Sulphite Pulp Extracted with 1% Sodium Hydroxide

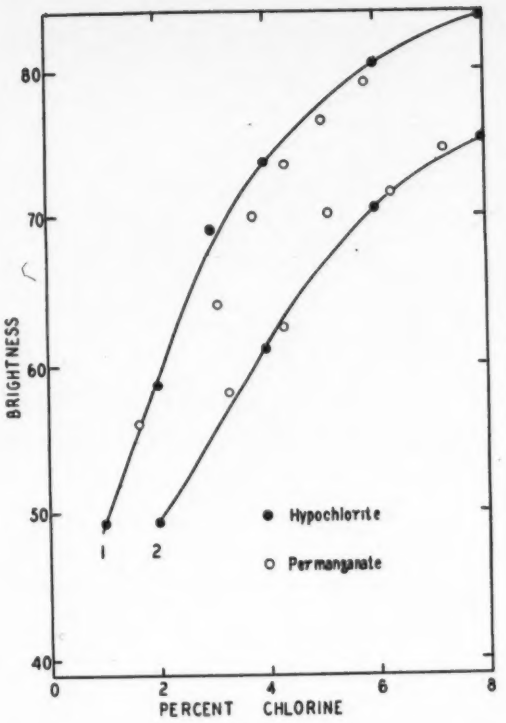

FIG. 4

Brightness-Bleachability Relationships. 1. West Coast Sulphite Pulp. 2. Scandinavian Sulphite Pulp.

The nature of the chlorine reaction tends to be increasingly one of oxidation when various extractive fractions are removed, as shown by the increase in percentage of chlorine which appears as hydrochloric acid. The 1% sodium hydroxide extracted pulp is an exception, the reaction being greater in the direction of substitution or addition.

The various extracts obtained from the pulp were treated to determine the permanganate and chlorine-water numbers with the results given in Table II.

TABLE I.—PERMANGANATE NUMBERS, CHLORINE NUMBERS, AND BLEACH CONSUMPTION OF EXTRACTED PULPS

Extraction	Soluble % A	$KMnO_4$ No. B	$KMnO_4$ No. as % Cl C	Cl-Water No. D	HCl Formed in D as % Cl E	$\frac{E}{D} \times 100$ F	Bleach Requirement G	Chlorine No. from $KMnO_4$ No. H	Roe Cl No. I
None	....	16.16	5.73	4.28	2.84	66	7.70	8.18	4.4
Ether	0.74	15.82	5.61	4.30	3.11	72	8.25	7.99	4.5
Acetone	1.04	15.42	5.47	4.17	3.01	72	8.42	7.75	4.4
Ether and alcohol	1.25	15.12	5.36	4.16	2.89	69	7.55	7.58	4.5
Alcohol-benzene	1.34	15.32	5.43	4.15	3.01	73	...	...	..
Hot water	1.39	14.65	5.19	3.99	2.91	73	7.35	7.30	4.1
One % HCl	12.7	11.59	4.11	3.03	2.27	75	5.17	5.60	3.1
One % NaOH	15.4	11.44	4.06	3.83	2.08	54	4.93	5.52	3.9
17.5% NaOH	16.7	12.83	4.55	3.55	2.24	63	6.53	6.28	3.6

A. Moisture-free unextracted basis.
B. Determined on a sample weight equivalent to one gram of moisture-free unextracted pulp.
C. Calculated according to: Potassium permanganate no. × 0.3546 = % chlorine.
D. Determined on a sample weight equivalent to one gram of moisture-free unextracted pulp.
E. Grams of HCl formed in chlorine-water number determination calculated according to: Hydrochloric acid formed × 35.46/36.46 = % chlorine.
F. Percentage of chlorine used which appears as hydrochloric acid.
G. Percentage available chlorine from hypochlorite solution.
H. Chlorine equivalent of calcium hypochlorite as obtained from the permanganate number by the conversion chart and formula in TAPPI Standard T 214 m-37.

All of the extracts consume much more permanganate than chlorine. The nature of the chlorine reaction as judged by the amount of hydrochloric acid formed is similar to that of the extracted pulps, except for the hot water extract in which the reaction is toward increasing oxidation.

TABLE II.—PERMANGANATE NUMBERS AND CHLORINE NUMBERS OF PULP EXTRACTS

Extract	$KMnO_4$ No. A	$KMnO_4$ No. as % Cl B	Chlorine-Water No. C	HCl Formed in C as % Cl D	$\frac{D}{C} \times 100$ E
Hot water	2.05	0.73	0.52	0.42	81
One % HCl	11.16	3.96	1.76	0.94	53
One % NaOH	13.34	4.73	1.81	...	..
17.5% NaOH	4.63	1.64	0.72	...	..
Lignin from unextracted pulp	6.91	2.45	1.21	0.83	69
Lignin from 1% HCl-extracted pulp	4.61	1.63	...	...	..
Lignin from 17.5% NaOH-extracted pulp	6.98	2.48	1.35	0.90	67

A. Expressed as cc. of 0.1 *N* permanganate consumed by material from one gram of moisture-free unextracted pulp.
B. Calculated according to: Potassium permanganate no. × 0.3546 = % chlorine.
C. Expressed as grams of chlorine consumed by material from 100 grams of moisture-free unextracted pulp.
D. Expressed as grams of chlorine in hydrochloric acid formed by material from 100 grams of moisture-free unextracted pulp in the chlorine-water number determination, and calculated according to: Hydrochloric acid formed × 35.46/36.46 = % chlorine.
E. Percentage of chlorine used which appeared as hydrochloric acid.

The summation of requirements of oxidizing agents for extracted pulps and the corresponding extracts are given in Fig. 2. In almost all cases the total requirement is greater for the sum of the extract and the extracted pulp than for the unextracted pulp. This may be attributed in part to the effect of penetration of reagents into the fiber, and the relatively greater ease of access of reagents to pulp constituents when separated by the extraction procedures. The requirement of oxidizing agents by the lignin is shown by tests on the separated lignin to be approximately one half or less of the total requirement of the original or extracted pulps.

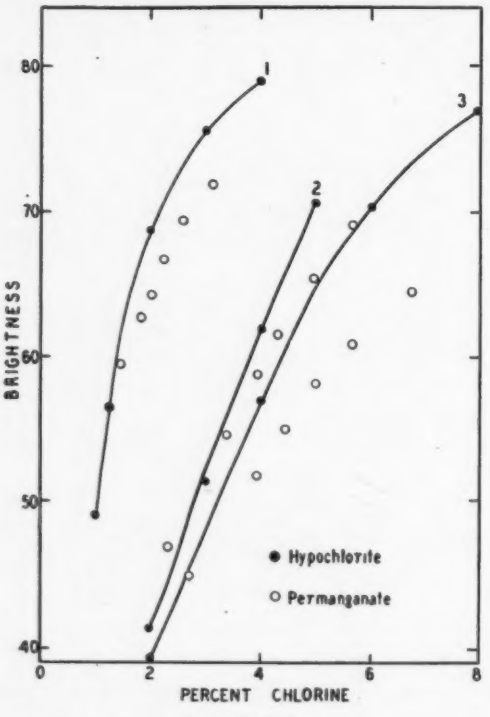

FIG. 5
Brightness-Blechability Relationships. 1. Soda Pulp. 2. Sulphate Pulp, Extracted with 1% Hydrochloric Acid. 3. Sulphate Pulp

TABLE III.—RELATION OF PERMANGANATE NUMBER AND CHLORINE-WATER NUMBER BRIGHTNESS TO BLEACH CONSUMPTION

Pulp	$KMnO_4$ No. as % Cl	$KMnO_4$ Brightness	Bleach * Consumption % Cl	Chlorine-Water No.	Chlorine-Water Brightness	Bleach Consumption ** % Cl
Ether	5.61	61.9	5.78	4.30	50.1	3.40
Acetone	5.47	63.0	5.40	4.17	52.4	3.25
Ether alcohol	5.36	62.4	5.65	4.16	53.2	3.88
Hot water	5.19	59.5	4.99	3.99	55.3	4.25
One % HCl	4.11	61.5	4.05	3.03	54.4	3.05
One % NaOH	4.06	64.9	4.33	3.83	51.8	2.73

* Bleach consumption required to produce the same brightness as that obtained in the permanganate number test.
** Bleach consumption required to produce the same brightness as that obtained in the chlorine-water number test.

Brightness of Pulps after Bleachability Determinations

After each of the bleachability tests was completed, the treated pulp was made into a sheet and the brightness determined. It was immediately evident that, to a large degree, the difference in measured bleach consumption was related to the brightness obtained during the treatment. Table III summarizes the brightness values after the permanganate and chlorine-water tests in comparison with the chlorine values obtained by the hypochlorite bleach consumption method for equivalent final brightness. For the permanganate-treated pulps the agreement is good. In the chlorine-water test the treated pulp must be treated with alkali to remove soluble chlorinated and colored products and agreement is much less exact.

Bleachability Test to Desired Brightness

After the relation of brightness following the permanganate number test and equivalent brightness from bleach consumption was established, further investigation of bleaching with permanganate to different brightness values was carried out. Bleaching curves with hypochlorite were determined on a number of pulps and for comparison a series of permanganate numbers were obtained by using the standard method and varying only the time of reaction. The permanganate numbers obtained as a function of time of reaction are shown in Fig. 3. Comparisons of the brightness after bleaching to various degrees with permanganate and hypochlorite are shown in Figs. 4 and 5.

For sulphite pulps (Fig. 4) the agreement is reasonably close, and the same brightness after the test is obtained for a given amount of chlorine equivalent, whether the bleaching is done with potassium permanganate or calcium hypochlorite. The agreement is almost exact for the Scandinavian sulphite pulp.

The agreement is less exact for alkaline pulps (Fig. 5). The final brightness for a given chlorine equivalent used is less with permanganate than with hypochlorite bleach. Extraction of the sulphate pulp with hydrochloric acid appreciably increased the agreement of the two methods.

Correlation of Bleachability Values

In the past, correlation between various bleachability tests has been impossible except through the use of empirically determined factors. This has been true for three reasons: *(a)* the results of different tests are expressed on various bases — e.g., cc. of 0.1 *N* permanganate, cc. of 0.02 *N* permanganate,

percentage chlorine, percentage hypochlorite, etc.; *(b)* it was not known to what degree the various reagents reacted with the several constituents in the pulps; and *(c)* the conditions of the different tests were such that the final degree of bleaching obtained was widely variant.

In order to facilitate correlation, it would be most desirable that all bleachability tests be expressed on the same basis. The most satisfactory basis appears to be *oxidation equivalence*, and results may suitably be expressed as percentage oxygen or percentage chlorine. The expression of *percentage chlorine* is to be preferred, because of the common use of chlorine and its compounds both in pulp bleaching and in bleachability tests and because the term is already in general use in the industry.

A further step in the correlation of bleachability tests consists of the necessary change of conditions in these tests so that the final brightness of the pulp is taken into account or so that the same final brightness is attained in each case. If the reagents used react in the same way, exact correlations should then be obtained.

The evidence obtained indicates that the reagents do not react in exactly the same way, but that the correspondence is sufficiently close to be of considerable interest. It is possible that added data would provide the basis for methods of such nature that the bleachability would be the same, regardless of tvpe of agent used when the same brightness is attained.

The close correspondence of the bleach consumption and the permanganate number methods when the brightness attained in the latter is taken into account suggests the possibility of developing a rapid method for the determination of equivalent bleach consumption, using permanganate as the reagent and determining the amount required to bleach to a specified brightness. Further work is being initiated for a study of this method.

It is recognized that insufficient data have been accumulated to define in an exact way the brightness-bleachability relations involved. To establish these relationships accurately and to determine precisely their value will require considerable test work under a wide variety of conditions. It is hoped that this report may serve as a stimulus to work which will lead to bleachability tests capable of more exact correlation than any which have heretofore existed.

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Preventive Maintenance for the Paper Machine*

By P. H. Tigwell[1]

Abstract

Understaffed engineering departments and maintenance crews are cited as causes of costly operation's interruption, in addition to incorrect lubrication, insufficient or untrained maintenance inspectors, and lack of management interest.

Often machinery of identical design and operating under similar conditions will give excellent results in one mill, and fail in another. In some cases, this is due to faulty design or defective materials, but usually it is due to the difference in the care and attention given the equipment.

Assuming that the machinery is properly engineered, the materials are good, and the workmanship is of high standard, the most important causes of mechanical difficulties are:

(1) Lack of attention to proper lubrication—the use of cheap lubricants, and lubricants not having the proper characteristics for their purpose.

(2) Failure of the mill to give equipment proper inspection.

(3) Lack of detailed operating instructions to mill.

There is no practical way of testing the mechanical parts that enter into a paper machine before it is placed in actual service. The expected life of a paper machine is so long and the duty so severe that several years of experience with actual service must be had, and operating results carefully followed, to be of much value to the designing engineer which means that each change in design has to be most carefully studied and every effort made to have the engineering as nearly perfect as possible. This also means that, as we are all human and make mistakes, and as long as changes in design are made (with the resulting progress in increased speeds and larger production), we shall always be confronted with some failures, due to the engineer's inability to foresee and provide against all of the elements involved.

The old machine required only the simplest of open-type construction. The modern high speed, heavy duty machine consists of precision made parts tightly enclosed for proper protection from the elements and hidden from sight. As an illustration of this, compare the old core gear drive with the modern hypoid or spiral bevel enclosed unit. The modern drive will very seldom get out of order, and if given proper lubrication and occasionally a little attention, will provide for many years of trouble-free service. However, if for one reason or another something does happen to one of these drives, a much higher degree of mechanical skill is required than was called for in the case of the old open core gear drive. Drive

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units have been used here to make this comparison, but the difference holds true throughout the design of the paper machine proper.

Engineers and Staff

For these reasons, the care and maintenance of all paper mill equipment should be placed in the hands of the engineers and skilled mechanics—men who are capable of knowing all about the hidden construction and how to proceed with adjustments if and when they are required. Even men of this ability require (and should receive) all possible assistance from the builder of the machine in the way of detailed instruction covering the proper operation and care of the equipment. In order for the mills to gain the most from them, the instructions should be arranged and handled systematically and placed in the hands of capable men. Unless systematically handled, they very often do not reach the engineers most interested and concerned.

Correct Lubrication

Careful analysis of reported mechanical failures from the mills reveals that many are due either to lack of lubrication or to the use of lubricants of improper characteristics. In many cases, a low grade lubricant, entirely unsuited to the purpose was used. We have known cases where (with proper lubrication) equipment has stood up well for many years, and inspection has revealed it to be in excellent condition, apparently good for an indefinite period of service. Then, shortly thereafter, failures start to take place, and inspection brings out the fact that, in an effort to save in operation costs, a cheaper grade of lubricant has been put into service. It is surprising and interesting to find that in many instances this change has been made without the knowledge of or consultation with the engineers.

On the subject of lubrication, it is my belief that few mills give this important matter the dignity that it deserves. Surprisingly often, the oiling is found to be in the hands of men entirely incapable of understanding the requirements of modern machinery, or machinery of any kind, old or new. It seems that the oilers have not been selected because of their capabilities in that work, but because it could be substituted as an easier job for some old employee who has become physically unfit to continue his work in some other department. Often the past work of this employee has been of a physical rather than mechanical nature. Obviously, the most economical results cannot be expected from such procedure, and much can be accomplished in the way of lowering maintenance expense by bettering the personnel in the direct supervision of this important work.

Preventive Maintenance Setup

We all realize the importance of preventive inspection. The question is: How can it be brought about in an economical way? It is probable that no set plan can be evolved to fit every mill organization; but I shall outline a general setup arrived at from knowledge of various plans already in practice in many mills, and a few suggestions of my own:

(1) Every machine in the mill is assigned a number; in case of machines having a multiplicity of parts, such as a paper machine proper, every bearing and roll or subassembly or, in fact, any part which is liable to require inspection or maintenance, should be assigned an identifying symbol or number in addition to the identification number for the machine proper. This should be accomplished for the purpose of identifying and properly recording the inspector's reports, and for the posting of cost of the work done on these parts.

(2) A set of index cards is to be provided and properly filed, with each machine or subpart having a card bearing its identifying number. These cards should be so arranged as to tie in with the cost department system, so that they are used for noting the work done on the part as well as the cost of the work and the date on which it took place. Many other notes for future reference can be posted on these cards, such as the date when the part was last carefully inspected, amount of lost time when the repairs were made, etc. Should failures occur and continue, these records will prove to be of great value in helping to determine what the future attitude should be toward the repairing of the part involved.

(3) Many mills combine the jobs of oiling and wiping the machinery. It is suggested that these two jobs be completely divorced, and the job of lubricating and inspecting be combined, and given the title of Equipment Inspector. To take care of this job, the best mechanics available should be selected and compensated accordingly, and every possible effort made to add dignity to the work. If each tour now has an oiler, each would be preferably replaced by men of this selection, but in every case the man in charge of this work during the day tour would be the most capable to be obtained. These men would not only provide for proper lubrication, but as they did so, they would be on a constant lookout, and capable of unearthing mechanical troubles which might be expected from reasons other than lack of lubrication. These men would circulate about the mill, and soon set up a routine that would provide that every piece of equipment be inspected and cared for as often as the circumstances might require.

They would be provided with reporting blanks on which they could make written reports of the important happenings during their time of duty. In making their reports, they would use the symbols and numbers which had been assigned to the machines or individual parts. These reports, together with close cooperation on the part of the maintenance department, would aid materially in the planning and scheduling of repair work.

These men would be selected for their mechanical ability, loyalty, ambition, mental and physical alertness; in every case they should have good senses of sight, hearing, smell, and touch. Bearings that are noisy and rough, the smell of hot oil, whining gears, loose parts, misaligned rolls, shafts and bearings, and all similar things which are the beginning of most failures will not escape the attention of competent mechanics who also have these other characteristics. Good mechanics cannot endure such things, and will not rest in peace until correction has been made.

Mechanical Personnel

Probably your first impression will be that to institute a plan of inspection of equipment along the lines of this one suggested would be too expensive to operate. Men having these capabilities cannot be had at the same rate that most mills are now paying to the men who supervise the lubrication of their equipment; but it is contended that this difference will be

infinitesimal in comparison with the savings that would be realized in maintenance expense alone, to say nothing of the savings from increased production by greatly reducing the time lost for making repairs and adjustments. Men with these capabilities would make many small adjustments while the machines are running which now do not receive attention until damage has taken place. It is further believed that a well systematized preventive inspection plan will pay big returns even in the smallest of mills but probably could be laid out on a much less elaborate scale than that required for the larger mills. In the smaller mill, it is possible that these responsibilities might be added to those of the Master Mechanic.

The equipment inspectors should be supplied with all the data obtainable on the operation and care, as well as the construction of the machinery under their care. Until they are perfectly familiar with the construction, they should, in every case, assist in making all major repairs and adjustments.

Roll Grinding

A special word on roll grinding would not be amiss here. Several mills are giving their rolls the benefit of scheduled grinding with excellent results. A gravel road, scraped regularly, will not take on that washboard surface. A roll ground regularly will provide a good surface for the sheet of paper, giving it a higher finish; will give more even drying conditions, longer felt life, longer wire life, and better operating conditions. Barring accident, roll surfaces go bad on schedule. Thus a grinding program can be worked out to insure good roll conditions by grinding them in time. Furthermore, the grinder will operate much more steadily and satisfactorily.

Maintenance should receive an increasing amount of serious thought by management. We must take good care of our machinery today as it is going to be hard to replace for a long time to come.

A Program of Microbiological Research*

By John W. Appling[1]

Abstract

A discussion is given of the microbiological research program at The Institute of Paper Chemistry, which includes (1) felt rotting, (2) slime, (3) A.P.P.A. program of biological control, (4) toxicity studies, and (5) studies with the new electron microscope.

This program has a two-fold purpose: (1) fundamental research and (2) practical applications of this research in the pulp and paper industry. Felt rotting, slime, and toxicity studies lean more to practical applications; however, much fundamental research is involved in arriving at the practical application desired. On the other hand, the A.P.P.A. program of biological control and the studies with the electron microscope are more purely fundamental research in nature.

Felt-Rotting Studies

Starting with the first phase of our microbiological research, felt-rotting studies were begun in 1934 when little was known about the cause of this phenomenon. During the years following, we have isolated from damaged felts eleven species of wool-decomposing bacteria besides many other species whose presence appeared to be a matter of chance. Our studies show definitely that certain kinds of bacteria can and do shorten felt life on the paper machine. Chemical and mechanical action either go hand in hand with or precede bacterial action on felts. Exhaustive tests have led to a reasonably quantitative method for evaluating the extent of bacterial action on felt strips *(1)*. By this method we hope to evaluate certain treatments of felts prior to their use on the machine. We may soon speak of bacteria-resistant felts whose life will more than compensate the additional cost of treatment.

Slime Studies

Slime studies constitute another part of our program. Up until this year our work has been with slime samples sent to us from mill members who requested certain information as to whether the samples were slime and if so, how it could be prevented. We have identified a number of slime-forming bacteria in some of these samples. These identifications together with all others made by us since 1934 will be published by Miss Smith *(2)*. A different approach to the study of slime has been made for each of three companies this year. In each case, the author has gone to the mill with adequate laboratory equipment for bacteriological surveys and has studied the problem with the aid of the laboratory personnel. This mode of attacking slime offers the best approach to solving the problem. It is difficult to diagnose a case of slime and to recommend the proper control without first-hand information. We believe that this information can be obtained by making three or more surveys spaced before and after clean-up periods and by careful inspection of the entire system in cooperation with a competent laboratory man who knows the setup at the mill.

Biological Control

The third phase of our program—namely, the A.P.P.A. program of biological control—is our most important microbiological activity. When the committee, headed by Allen Abrams, initiated its work in 1939, the general program was made up of three parts: (1) Literature survey, (2) fundamental research at the Institute, and (3) general consultation with F. W. Tanner. The literature survey was prepared and published by the Institute in February, 1940. The fundamental research at the Institute was carried out by the author with the aid of an assistant. This research consisted principally in selecting and developing bacteriological methods for use in studying the sanitary conditions of those paper mills which are engaged in making paper for food

* Presented at the Fall Meeting of the Technical Association of the Pulp and Paper Industry, Ann Arbor, Michigan, September 16-19, 1941.
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packaging. The methods finally adopted were utilized in part by a TAPPI committee last year for preparing "Tentative Procedures for the Bacteriological Examination of Paper" *(3)*. The public relations part of this program was distinctly educational in nature. Under Dr. Tanner's direction papers were presented before annual meetings of the A.P.P.A. and TAPPI, the American Public Health Association, and the American Oil Chemists' Society. Efforts were made also to establish constructive relationships with the various bacteriologists in the country who are considered as authorities in the field of food packaging.

Since the main objectives outlined for the first year's activities of the A.P.P.A. led to the adoption of methods of collecting samples and of analyzing them, new objectives were set up by this committee in May, 1940. It was decided to continue along the line of fundamental research and to pursue the following objectives: (1) Continuation of bacteriological surveys for as many different mills as possible and (2) study of the lethal effect of drier roll temperatures.

As a part of this program, we have conducted bacteriological surveys in the paper mills of eleven different companies. Four glassine mills, two waxed paper mills, and five paperboard mills are included and thus data have been assembled concerning various mills in each group. The paperboard mills visited include some using only primary stock as pulp and others using principally waste paper. More complete data have been gathered from the glassine mills than from any other mills, chiefly because they were the last three mills visited, and because our cumulative experience has indicated the need for such data; for example, we have been recording pH and temperature of the samples for these last mills, whereas at first we did not obtain these data. Instead of presenting bacteriological data at this time, an attempt will be made to generalize the data in order to present what seem to be the most significant results.

Results of Mill Surveys

These surveys indicate clearly that some mills, notably those manufacturing paper and paperboard for food packaging, are doing a remarkably efficient job of controlling bacteria. Certain mills have routine bacteriological control as a part of their testing program. Here and there we find a mill using no routine bacteriological testing but doing a remarkable job of controlling bacteria. Good housekeeping is an essential prerequisite to the control of slime, fungous growth, and the production of paper having a low bacterial content.

These surveys show very definitely that adequately chlorinated (about 0.4 p.p.m. residual) and filtered fresh water is essential for mills producing paperboard of low bacterial content. This same high-grade water is desirable for any mill subject to slime troubles. Again we noticed that the recirculating white water should be sterilized as much as possible by the judicious application of disinfectants.

Again, these surveys have revealed the presence of coliform bacteria in the wet system of practically every mill visited and the absence of these bacteria from every paper and paperboard sample regardless of the mill which produced them. We do not know whether any sanitary significance should be given to the fact that these coliform bacteria are so frequently found in the wet system. A few mills are known which are free from these bacteria. These mills use an excellent fresh water and only virgin chemical pulp. One important member of the coliform group is a notorious slime-former. From this point of view, the absence of the coliform group would be very desirable!

The second objective of the 1940-41 program of the Biological Control Committee—namely, a study of the lethal effect of drier roll temperatures—is an important one. Some papermill men are surprised when this point is mentioned, because they think that no living matter could survive the drying process on the paper machine. As a matter of fact, it is difficult to obtain sterile paperboard as those who strive to produce it know only too well. When little or no bacteriological control is exercised before the wet web reaches the driers, paperboard may have a bacterial content of hundreds of thousands per gram depending upon the grade of pulp, the sterility of the fresh water, and the bacterial content of the white water. Important laboratory experiments are under way at the Institute to determine how many minutes a given type of heat-resistant bacteria will survive the usual range of drier-roll temperatures and humidities. It may be that these conditions will prove entirely ineffective for the time factor needed on the paper machine for a given type of paper. If such is the case, greater attention must be given to killing these heat-resistant bacteria before they reach the drier rolls. On the other hand, we know that bacteria of low heat resistance do not survive drier-roll temperatures. Fortunately almost all pathogenic bacteria have a low heat resistance and would not survive drier-roll conditions.

Toxicity Studies

Only brief mention can be made to the remaining phases of our microbiological research program. Toxicity studies are made for several reasons. Citrus fruit wrappers require a volatile fungicide which prevents mold growth. We have tested numerous fungicides for this purpose and we have recommended the most promising ones for commercial use. Comparative toxicity studies for commercial disinfectants such as sodium pentachlorophenate, Lignasan, and P. M. 8 have been made from time to time. We cannot recommend any one on the basis of laboratory studies alone, because mill conditions also influence the choice.

Finally, mention may be made of the studies involving the use of the electron microscope. Some of you know, of course, that our best optical microscopes offer a limiting magnification of 1000 diameters. The electron microscope will reveal structural details of bacteria and fungi about which we have only been able to guess without greater magnification of 1000 X. We have taken "pictures" of flagella, capsules, and spores, all of which require no staining technique such as is necessary for the optical microscope. Capsules are definitely a part of slime-forming bacteria and spores are directly related to heat resistance. Fundamental research with this new tool should result in a better understanding of slime and in producing more sterile paper.

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An Investigation of Spruce Thiolignin*

By C. Edward Ahlm[1]

Abstract

An investigation of thiolignin obtained from black spruce with sodium hydrogen sulphide and sodium sulphide has been made. The purified thiolignins of four cooks carried out under various conditions differ only slightly in their chemical composition. With increasingly drastic conditions in the cook, the methoxyl content of the thiolignin decreases while the sulphur content seems to increase slowly.

That the sulphur is present in thiolignin in the form of a mercaptan group is indicated by the formation of a mercury salt. The sulphur and the mercury contents in this salt correspond to the presence of one mercaptan group per lignin building unit of a molecular weight of 840. Various derivatives of thiolignin were prepared by methylation (diazomethane, methanol and hydrochloric acid, dimethyl sulphate and sodium hydroxide) and by acetylation. From these reactions and the analytical data of thiolignin and its derivatives it is concluded that sodium hydrogen sulphide and sodium sulphide react with the carbonyl group of the lignin building unit with the formation of a mercaptan group.

In the manufacture of pulp by the kraft process, wood chips are digested at an elevated temperature with a cooking liquor containing sodium sulphide and sodium hydroxide usually in a ratio of 1:2. Under these cooking conditions almost all the lignin in the wood is converted into an alkali-soluble derivative, which contains a small percentage of sulphur. It has been called "thiolignin" in order to differentiate it from the alkali lignin which is obtained from the black liquor of the soda process.

Very little attention has been paid to the problem of determining the constitution and the chemical properties of thiolignin or to the mechanism of the reaction taking place between lignin and the reagents used in the kraft pulping process. Klason and Segerfelt *(1)* isolated thiolignin from a commercial sulphate black liquor by precipitating it with carbon dioxide and extracting the precipitate with chloroform to remove any soluble impurities. Their thiolignin contained 63.3% carbon, 5.2 % hydrogen and 12.4% methoxyl. No sulphur determination was mentioned. As hemicelluloses and pentosans are precipitated from the alkaline solution with the lignin and are insoluble in chloroform, it seems doubtful that Klason's product was free from such impurities. In 1923 Anderzén and Holmberg *(2)* investigated a thiolignin obtained from a commercial sulphate cook of coniferous woods by precipitation with hydrochloric acid. They fractionated their thiolignin into an alcohol-soluble fraction, called alpha-alkali lignin with 67.2% carbon, 5.4% hydrogen, 2.6% sulphur and 11.3% methoxyl (based on the ash-free product), and an alcohol-insoluble fraction, called lambda-alkali lignin having a chemical composition of 67.7% carbon, 5.9% hydrogen, 2% sulphur and 12.5% methoxyl (based on the ash-free product). Compared with other lignins from coniferous woods, the carbon content is rather high and the methoxyl content is low. In a study of the effect of sulphidity in the kraft pulping process, Hanson *(3)* found that the sulphur content of thiolignins prepared from cooks under various cooking conditions varied from 4.8 to 10.7%. In preliminary experiments carried out in 1938 as a part of the lignin course at The Institute of Paper Chemistry, Willstätter spruce lignin with a methoxyl content of 14.8% was completely dissolved when heated with a 10% solution of sodium sulphide at 170 deg. C. for one hour. From the dark reddish-brown solution, a thiolignin with a methoxyl content of 14.4% and a sulphur content of 3.7% was precipitated in almost quantitative yield on acidification with hydrochloric acid. As this sulphur content corresponds to the entrance of one sulphur atom into a lignin building unit of a molecular weight of 840, and the decrease of the methoxyl content accounts for the increase of the molecular weight, indicating that no methoxyl has been split off on heating with the sodium sulphide solution, a new investigation of the thiolignin obtained from cooks of sprucewood with sodium sulphide solutions was carried out.

Preparation of Thiolignin

The composition of any lignin isolated from wood by a pulping process depends not only on the type of reagents used but seems also to be affected by the cooking variables such as chemical ratio, liquor to wood ratio, cooking temperature and cooking time. As it was the purpose of this investigation to obtain, if possible, two thiolignins which differed markedly in their sulphur content, variations in the cooking time, the chemical agent, and the chemical ratio were studied. Five cooks were carried out, the conditions of which are given in Table I.

TABLE I

Cook	1	2	3	4	5
Reagent	NaSH	NaSH	Na_2S	Na_2S	NaSH
Concentration expressed in percentage as equivalent NaOH	3	3	3	3	6
Chemical ratio, based on wood and equivalent NaOH	30	30	30	30	60
Time at maximum cooking temperature in hours	1.5	3.5	1.5	3.5	3.5

The cooks were carried out in a stainless steel autoclave with a capacity of approximately five liters, using about 300 grams of air-dried black spruce sawdust which had been extracted with a mixture of equal parts of benzene and 95% alcohol in a Soxhlet extractor for 24 hours. The digester was heated up to the maximum cooking temperature of 160 deg. C. in 65 minutes, using a wax bath to secure uniform heating. The time required to cool the digester to 90 deg. C. was about 1.5 hours.

The black liquor was separated from the pulp by filtration and the thiolignin immediately isolated by acidification of the filtrate with a slight excess of hydrochloric acid. The light greenish-yellow precipitate was allowed to settle, the supernatant liquor was

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decanted, the precipitate suspended in distilled water and filtered. It was washed on the filter until neutral to Congo red paper and partially dried on a porous plate. The crude thiolignin was then dissolved in anhydrous dioxane and concentrated under reduced pressure until the last traces of water were removed. Fresh anhydrous dioxane had to be added during the distillation. With the removal of the water a precipitate consisting of sulphur and carbohydrate material separated out. The dioxane solution was centrifuged and diluted with dioxane to give an approximately 10% solution. The thiolignin was isolated from this solution by adding it dropwise into vigorously stirred anhydrous ether. The precipitate was washed twice with ether, twice with petroleum ether, and dried over sulphuric acid in a vacuum desiccator. The thiolignin was then extracted in a Soxhlet extractor with carbon disulphide for several hours, redissolved in dioxane, and isolated as before. This purification of the thiolignin was repeated until a lignin with a constant methoxyl content was obtained. A test of the thiolignin for carbohydrate material by treating it with 72% sulphuric acid and testing the filtrate after neutralization with barium carbonate indicated the absence of carbohydrates. The thiolignins obtained from the five cooks were analyzed, the results of which are given in Table II.

TABLE II—ANALYSIS OF THE THIOLIGNINS *

Cook	1	2	3	4	5
Methoxyl, %	14.6	14.2	14.3	13.7	13.0
Carbon, %	64.2	64.2	63.8	63.5	...
Hydrogen, %	5.6	5.6	5.5	5.5	...
Sulphur, %	3.2	3.1	3.2	3.4	4.2
Ash, %	1.9	1.3	0.3	0.3	...

* All analyses are calculated on an ash-free basis.

The pulps of the cooks were analyzed for their lignin contents and the lignins for their methoxyl and sulphur contents. The results are given in Table III.

TABLE III.—ANALYSIS OF THE PULPS

Cook	1	2	3	4	5
Yield of pulp, %	63.3	58.7	60.0	54.8	47.7
Lignin in pulp, %	16.0	12.7	15.6	10.0	3.2
Methoxyl in lignin, %	15.2	15.1	15.1	14.4	12.9
Sulphur in lignin, %	1.6	1.6	1.4	1.8	3.2

Methylation of Thiolignin with Diazomethane

In spite of the fact that the chemical composition of the thiolignin of the Cooks 1 to 4 differ only slightly from each other, they were methylated in anhydrous dioxane solution with diazomethane. For this purpose six-gram samples were dissolved in 50 cc. anhydrous dioxane and diazomethane prepared from 15 cc. ethyl *N*-nitroso-*N*-methyl-carbamate and 30 cc. sodium glycolate was passed into the solution. This methylation was repeated until a constant methoxyl content was obtained. The products, isolated from their dioxane solution by dropping the solutions into dry ether as before, were analyzed. The results are given in Table IV.

TABLE IV.—ANALYSIS OF THE DIAZOMETHANE-METHYLATED THIOLIGNINS

Cook	1	2	3	4
Methoxyl, %	24.8	25.2	24.8	24.8
Carbon, %	65.4	65.3	64.9	65.8
Hydrogen, %	6.1	6.0	5.9	6.0
Sulphur, %	2.4	2.5	2.1	2.5
Ash, %	1.8	1.3	0.1	0.25

Preparation of Other Derivatives of Thiolignin

Since there did not seem to be a very great difference in the behavior of the thiolignins of the four cooks toward diazomethane, indicating the number of hydroxyl groups susceptible to methylation is the same in the four products, a number of other derivatives of thiolignin from Cook 1 only were prepared according to the methods used in the study of native spruce lignin *(4)*.

Samples of thiolignin and of diazomethane-methylated thiolignin were acetylated. The diazomethane-methylated thiolignin was methylated with dimethyl sulphate and sodium hydroxide until a constant methoxyl content was reached. Thiolignin and diazomethane-methylated thiolignin were methylated by refluxing them with anhydrous methanol containing 2% anhydrous hydrogen chloride for 2.5 hours and a portion of the methanol thiolignin was further methylated with diazomethane. The analysis of these derivatives is given in Table V.

TABLE V—ANALYSIS OF THIOLIGNIN DERIVATIVES

	C	H	S	CH_3O
Thiolignin	64.2	5.6	3.2	14.6
No. 1 acetylated	62.6	5.5	2.1	11.6
No. 1 methylated with CH_2N_2	65.4	6.1	2.4	24.8
No. 3 acetylated	64.2	5.8	2.0	21.5
No. 3 methylated with Me_2SO_4 and NaOH	66.2	6.4	1.3	33.9
No. 1 methylated with MeOH and HCl	64.9	5.7	3.2	18.2
No. 6 methylated with CH_2N_2	...	..	..	25.9
No. 3 methylated with MeOH and HCl	...	..	..	26.0

Test for the Presence of a Mercaptan Group

In the reaction between lignin and sodium hydrogen sulphide, either a mercaptan or a thio ether derivative is formed. If a mercaptan is formed, this should give a mercury salt. When one gram of thiolignin in 60 cc. glacial acetic acid is treated with a solution of mercury acetate the mercury salt of thiolignin precipitates. The precipitation is completed by addition of distilled water. The centrifuged product is washed with water, dried, redissolved in dioxane containing some anhydrous methanol and precipitated into ether in the conventional manner. The mercury salt of thiolignin is a reddish-gray powder with a methoxyl content of 12.9%, a mercury content of 10.6% and a sulphur content of 3.3%.

Discussion

The data in Table III, in which Cooks 1 and 3 and Cooks 2 and 4 can be compared as each pair differs only in the chemical reagent used, indicate that the pulping action of sodium sulphide is slightly more effective than that of sodium hydrogen sulphide in spite of the fact that the amount of titratable alkali is the same in both cases. It is also shown from the results that, by increasing the length of time during which the cook is held at maximum cooking temperature, the pulping action of sodium hydrogen sulphide and of sodium sulphide increases in approximately the same ratio. The effect of chemical ratio and concentration of the cooking liquor is shown for sodium hydrogen sulphide by comparison of Cook 2 with Cook 5. When the concentration is increased 100% and with it the chemical ratio, the pulping effect is increased as is shown by the decrease of the yield of pulp from 58.7% to 47.7% and the decrease of the lignin content from 12.7% to 3.2%. Whereas under mild cooking conditions the composition of the resulting thiolignins does not vary, it seems that as the cook becomes more drastic the methoxyl content decreases and the sulphur content increases. As the pulp of Cook 5 parallels a commercial pulp this may explain why earlier workers *(1, 2)*, using a waste liquor from commercial cooks, found such low methoxyl contents. As the decrease of methoxyl is higher

than would correspond to the increase in molecular weight by the entrance of sulphur, some methoxyl groups must have been split off under these more drastic conditions.

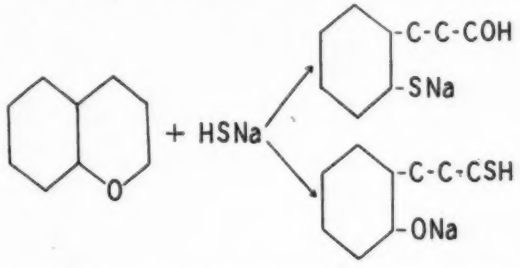
The methoxyl content of the diazomethane-methylated thiolignins of the first four cooks are practically the same, indicating the number of acidic hydroxyl groups is the same, no matter whether the thiolignin is isolated by means of sodium hydrogen sulphide or sodium sulphide. It is noticeable that the sulphur content decreases more than the increase of the molecular weight by the entrance of the new methoxyl groups would account for.

Theoretical Interpretation of Thiolignin and Its Derivatives

The study of native sprucewood has shown that, on the basis of a molecular weight of 840 for the lignin building unit, the latter has four methoxyl groups. When a carefully prepared Willstätter spruce lignin with a methoxyl content of 14.8% is cooked with a 10% solution of sodium sulphide at 170 deg. C. for one hour, it is completely dissolved and after purification a thiolignin with a sulphur content of 3.7% and a methoxyl content of 14.4% is obtained. The decrease of the methoxyl content corresponds to the increase of the molecular weight of the lignin unit by the entrance of the sulphur. This indicates that under mild conditions no methoxyl groups are split off and the methoxyl content corresponds to the presence of four methoxyl groups per unit. The molecular weights of the building unit of the various thiolignin derivatives can be calculated on the basis of four methoxyl groups according to the general equation: $(4 \times 31.02 \times 100) / X = K$, in which X is the molecular weight and K is the found methoxyl content of the respective derivative. The molecular weight is then found to be 849 for thiolignin and 1069 for the acetylated thiolignin. Similar calculations have been carried out with the methylated products for the determination of the newly introduced methoxyl groups. When on the basis of a molecular weight of 849 for thiolignin the number of acetyl groups in the acetylated thiolignin is calculated according to the equation $(4 \times 31.02 \times 100) / [849 + y\ (43.02 - 1)] = 11.6$, it is found that approximately five acetyl groups have been introduced. The same number is obtained when the difference between the molecular weights of acetylated thiolignin and thiolignin is divided by the molecular weight of the acetyl group. The molecular weight of the mercury salt calculated from the methoxyl content on the basis of four methoxyl groups for the lignin building unit is found to be 962 and the number of mercury atoms per unit is found to be 0.52—in other words one mercury atom is combined with two lignin building units. When the sulphur content of thiolignin is calculated from the mercury salt on the mercury-free basis, it is found to be 3.7%, a value which is in good agreement with the sulphur content of the thiolignin from Willstätter lignin but about 0.5% higher than that of the thiolignin prepared directly from sprucewood. The reason for the lower sulphur content in the thiolignin from the four cooks may be that the dilute sodium hydrogen sulphide or sodium sulphide solution is partially hydrolyzed with the formation of sodium hydroxide, which in turn forms alkali lignin. The low sulphur content of the thiolignins prepared by Anderzén and Holmberg (*2*) from a black liquor of a commercial kraft cook, in which a ratio of sodium hydroxide to sodium sulphide of 2:1 was used, supports this theory. As only the thiolignin gives a mercury salt, the latter may be used for the separation of thiolignin from alkali lignin. The higher sulphur content of the mercury salt indicates that the thiolignin with a sulphur content of 3.2% is contaminated with some alkali lignin, from which it is separated by formation of the mercury salt. As the methoxyl content of alkali spruce lignin is 14.9% *(5)*, the presence of alkali lignin has no great effect on the methoxyl content of thiolignin. The fact that thiolignin forms a mercury salt indicates that the sulphur is present in thiolignin as a mercaptan group and the question arises as to how or where this mercaptan group is introduced into the lignin unit. In order to establish the location of the mercaptan the following possibilities are considered:

(a) The sodium hydrogen sulphide reacts with one of the hydroxyl groups of the lignin, the result of which will be the replacement of a hydroxyl group by a mercaptan group.

(b) The sodium hydrogen sulphide reacts with the lignin by the opening of an oxygen ring with the formation of a mercaptan group and a new hydroxyl group. These new groups would be either phenolic or aliphatic in character depending upon the manner in which the ring is opened.



(c) The sodium hydrogen sulphide reacts with the carbonyl group.

Because in the first two cases the number of hydroxyl groups would be affected, the number of the methoxyl and hydroxyl groups of the various thiolignin derivatives will be compared with those in native spruce lignin *(4)*. An empirical formula for spruce thiolignin building unit can be developed from the analytical data of thiolignin and its derivatives. The various groups in this formula and in those of the thiolignin derivatives are compared with the corresponding compounds of native spruce lignin. In Table VI the methoxyl, hydroxyl, and acetyl groups of the various thiolignin derivatives are compared with those of the corresponding native lignin derivatives. In native lignin, diazomethane methylates two hydroxyl groups, one of which is acidic or phenolic in character, the other formed as a result of the enolization of the carbonyl group. On methylation of thiolignin with diazomethane, three new methoxyl groups are introduced. If the mercaptan group in the thiolignin has replaced a hydroxyl group capable of methylation with diazomethane, one or two methoxyl groups would be introduced, depending upon whether or not the mercaptan group is methylated with diazomethane. Since three methoxyl groups are introduced, this possibility may be rejected. If, on the other hand, the mercaptan group has replaced an aliphatic hydroxyl group and has been methylated, three methoxyl groups would be introduced which would be in

agreement with the experimental data. When diazomethane-methylated native lignin is acetylated, three acetyl groups are introduced, indicating the presence of three aliphatic hydroxyl groups in the building unit of native lignin. If, in thiolignin, one of these aliphatic hydroxyl groups is substituted by the mercaptan group and the latter is also methylated, then three methoxyl groups—by methylation of the phenolic and enolic hydroxyl groups and the mercaptan group—would be introduced in agreement with the experimental findings.

TABLE VI.—COMPARISON OF THIOLIGNIN FROM SPRUCE WITH NATIVE SPRUCE LIGNIN

	Thiolignin				Native Lignin			
	Mol. wt.	No. of CH_3O Groups	No. of OH Groups	CH_3O %	Mol. wt.	No. of CH_3O Groups	No. of OH Groups	CH_3O %
1. Thiolignin or native lignin	862*	4	..	14.6	839	4	4	14.8
2. No. 1 acetylated...	1069	4	5†	11.6	...	..	..	...
enol form	....	..	..	...	1048	4	5†	11.8
3. No. 1 methylated with CH_2N_2	....	7	3	24.8	866	6	3	21.4
4. No. 3 acetylated...	....	7	3†	21.5	992	6	3†	18.9
5. No. 3 methylated with Me_2SO_4 and NaOH	....	10.3	..	33.9	908	9	0	31.3
6. No. 1 methylated with MeOH and HCl	....	5	..	18.2	884	6	4	20.9
7 No. 6 methylated with CH_2N_2	....	7.6	..	25.9	898	7	3	25.4
8 No. 3 treated with MeOH and HCl...	....	7.6	..	26.0	898	7	3	25.5‡

* Calculated from the mercury salt.
† Acetyl group.
‡ After remethylation with diazomethane.

In this case, however, the unchanged carbonyl groups should still be present. That this is not the case is proved by the treatment of the thiolignin with methanol and hydrochloric acid, whereby only one methoxyl group is introduced, whereas native lignin under the same conditions contains two new methoxyl groups. This indicates that in thiolignin the carbonyl group is no longer present as such.

If thiolignin is formed by the opening of an oxygen ring, the fully methylated thiolignin should have eleven methoxyl groups, whereas only ten are introduced, and the mercaptan group should be quite firmly combined to the lignin molecule. The low sulphur content (1.3%) of the fully methylated thiolignin (instead of the theoretically calculated 2.6%) indicates that the sulphur is quite labile, as about half of the sulphur is split off during the methylation process. The carbonyl groups also should be present, which is not the case. This hypothesis therefore must be rejected.

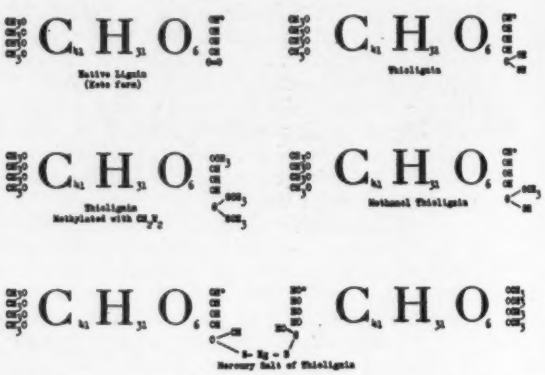
As already mentioned when native spruce lignin is treated with methanol and hydrochloric acid, two methoxyl groups are introduced with formation of an acetal. Methylation of thiolignin by this means, on the other hand, introduces only one methoxyl group. This difference in behavior indicates that the carbonyl group is involved in the formation of thiolignin. The manner in which sodium hydrogen sulphide reacts with the carbonyl group is still unknown. It is believed, however, that the reagent adds to the carbonyl group in a way similar to the addition of sodium hydrogen sulphite with the formation of a hydroxyl group and a mercaptan group.

$$C=O + HSNa \rightarrow C\begin{matrix}OH\\SNa\end{matrix} \quad ; \quad C=O + HSO_3ONa \rightarrow C\begin{matrix}OH\\SO_2ONa\end{matrix}$$

A similar conclusion has been reached by Hägglund *(6)*.

Unfortunately very little is known about the reaction of hydrogen sulphide or its alkali salts on carbonyl compounds. In 1890 Baumann *(7)*, in a study of the reaction of hydrogen sulphide and aldehydes, came to the conclusion that hydroxy mercaptans of the type RCH(OH)SH are formed. These compounds are not very stable, as they condense with each other by splitting off water or, in alkaline solution, with the loss of hydrogen sulphide instead of water. This may account for the loss of sulphur in the alkaline methylation process of thiolignin with dimethyl sulphate.

On the basis of the formula for native lignin, the following empirical formulas for thiolignin and its derivatives are proposed:



This formula fulfills all the experimental results. It has four methoxyl groups. Acetic anhydride and pyridine acetylates the five hydroxyl groups. Diazomethane methylate the phenolic hydroxyl group (marked by an asterisk) and the OH and SH groups at the carbonyl group. In the acetylation of the diazomethane-methylated compound, the residual three hydroxyl groups react. Methylation of thiolignin with methanol and hydrochloric acid involves the hydroxyl group at the carbonyl carbon atom. Two thiolignin units combine with one mercury atom to form the mercury salt. The investigation is being continued.

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(3) Hanson, F. S., *Paper Trade J.* 112, no. 2:32(Jan. 9, 1941); *Tech. Assoc. Papers* 23:163(1940).
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(5) Marshall, H. B., Brauns, F. E., and Hibbert, H., *Can. J. Research* B 13:103(1935).
(6) Hägglund, E., *Svensk Paperstidn.* 44, no. 9:183-191(May 15, 1941).
(7) Baumann, E., *Ber.* 23:60(1890).

Priority for Laboratories

A plan to assist research laboratories to obtain essential materials for research projects has recently been inaugurated by the priorities division of OPM and known as the Research Laboratories Supplies Plan.

Under this plan, the American Paper and Pulp Association, E. W. Tinker, secretary, 122 East 42nd street, New York, explains that laboratories may secure an A-2 rating by applying to the Chemical Branch of the Office of Production Management on form PD-88. It is pointed out that this blanket rating of A-2 is probably higher than would otherwise be assigned.

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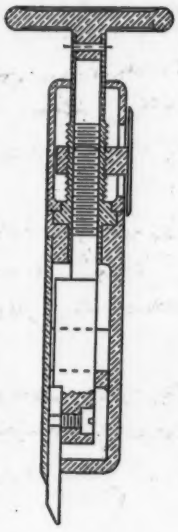
THE SANDY HILL BERTRAMS FLOW DISTRIBUTOR FOR UNIFORM DISTRIBUTION



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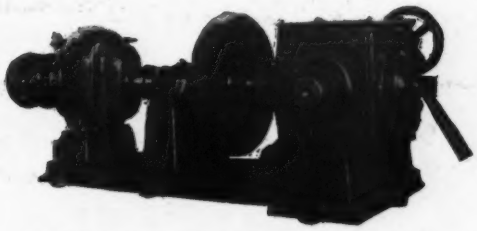
SOLE REPRESENTATIVE TO MANUFACTURE AND SELL THE BERTRAMS SHAKE AND FLOW DISTRIBUTORS IN THE UNITED STATES.



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Effective September 30, 1939, under Treasury Decision 49,970, all publications, exchanges and trade associations were denied access to import manifests at the New York Customs House. The Paper Trade Journal and other interested parties have vigorously protested this ruling, and as soon as the order of the Treasury Department is modified or rescinded, full publication of all manifests will be resumed in these columns. In the interim, the Paper Trade Journal is making every possible effort to gather all available information from manifests, at various outside sources.

NEW YORK IMPORTS

WEEK ENDING SEPTEMBER 20, 1941

SUMMARY

Newsprint	3,465 rolls
Printing paper	20 cs.
Filter paper	40 cs.
Drawing paper	10 cs.
Photo paper	40 cs.
Tissue paper	68 cs.
Tracing cloth	121 cs.
Bowl paper	48 bls.
Decalcomania paper	47 cs.
Miscellaneous paper	10 cs.

NEWSPRINT

H. G. Craig Co., Inc., ——, Donnacona, 383 rolls.
International Paper Co., ——, Gatineau, 328 rolls.
H. G. Craig Co., Inc., ——, Donnacona, 364 rolls.
——, ——, Liverpool, N. S., 1,352 rolls.
H. G. Craig Co., Inc., ——, Donnacona, 340 rolls.
International Paper Co., ——, Gatineau, 325 rolls.
H. G. Craig Co., Inc., ——, Donnacona, 373 rolls.

PRINTING PAPER

Oxford University Press, ——, Liverpool, 20 cs.

FILTER PAPER

H. Reeve Angel & Co., Inc., ——, Liverpool, 18 cs.
H. Reeve Angel & Co., Inc., ——, Liverpool, 22 cs.

DRAWING PAPER

H. Reeve Angel & Co., Inc., ——, Liverpool, 6 cs.
H. Reeve Angel & Co., Inc., ——, Liverpool, 4 cs.

PHOTO PAPER

Medo Photo-Supply Co., ——, Liverpool, 4 cs.
——, ——, Liverpool, 26 cs.
Medo Photo-Supply Co., ——, Liverpool, 10 cs.

TISSUE PAPER

G. F. Malcolm Co., ——, Liverpool, 42 cs., (gauze carbonizing).
G. F. Malcolm Co., ——, Liverpool, 26 cs., (gauze carbonizing).

TRACING CLOTH

——, ——, Liverpool, 29 cs.
——, ——, Liverpool, 92 cs.

BOWL PAPER

Hurley Johnson Corp., ——, Liverpool, 48 bls.

DECALCOMANIA PAPER

B. F. Drakenfeld & Co., ——, Liverpool, 45 cs., (duplex), 2 cs., (simplex).

MISCELLANEOUS PAPER

——, ——, Liverpool, 10 cs.

RAGS, BAGGINGS, ETC.

W. Steck & Co., Inc., ——, Calcutta, 250 bls. old hemp strings.
New England Waste Co., ——, Recife, 102 bls. cotton waste.
——, ——, Cabedello, 272 bls. cotton waste.
Commercial Natl. Bank Trust Co., ——, Cabedello, 262 bls. cotton waste.
New England Waste Co., ——, Santos, 1,216 bls. cotton linters.
Schimmel Trading Corp., ——, Recife, 333 bls. cotton linters.
C. Kutz, ——, Recife, 21 bls. cotton linters.
Riverside Mills, ——, Recife, 77 bls. cotton linters.
——, ——, Liverpool, 67 bls. rags.
——, ——, Liverpool, 8 bls. rags.
——, ——, Liverpool, 144 bls. rags.
Philadelphia National Bank, ——, Callao, 220 bls. cotton waste.
Philadelphia National Bank, ——, Paita, 242 bls. cotton waste.

OLD ROPE

W. Steck & Co., Inc., ——, Cristobal, 53 bdls.
D. M. Hicks, Inc., ——, Calcutta, 223 bls. (old hemp rope cuttings).
R. L. Protchard & Co., ——, Calcutta, 123 bls. (old hemp rope cuttings).

HIDE CUTTINGS

South African By Products Corp., ——, Africa, 117 bls.
——, ——, Liverpool, 182 bags.
——, ——, Liverpool, 320 bags.
——, ——, Liverpool, 200 bags.

FLESHINGS

——, ——, Havana, 32 bls.
H. Remis & Co., ——, Havana, 250 bls.
1st Natl. Bank of Boston, ——, Havana, 110 bls.

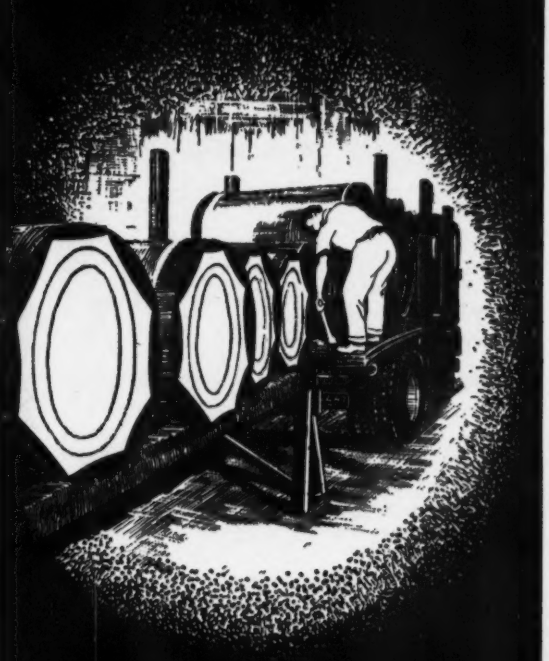
Blanket Priority Sought

A blanket priority rating for the paper and pulp industry will be sought to supply essential materials for the maintenance of the industry. This was discussed at a meeting of the American Paper and Pulp Association, held at the Waldorf-Astoria Hotel, New York, on September 22. This blanket priority is now in effect for many industries and because of the importance of the paper and pulp industry it is the general opinion that a more favorable status should be given to the paper and pulp industry during the period of unlimited emergency.

An equitable priority rating is essential for the continued operation of paper and pulp mills and the association is active in its endeavor to obtain a fair rating from the Priorities Division of the Office of Production Management to avoid the hardships which would result from the closing of mills through lack of needed replacement parts and repair items.

The chlorine situation is serious and it is hoped that the industry may not be required to reduce its consumption of chlorine more than 40%. The industry consumes about 25% of the annual production and the current consumption of chlorine has been reduced to approximately 20%.

NATIONAL DYES for Colored Newsprint



For coloring of groundwood papers—posters, newsprint, etc.—we offer a selection of National dyes which will produce level shades practically free from visible uncolored wood shives. For further information please contact our Technical Service Department at the below mentioned points.

NATIONAL ANILINE & CHEMICAL CO., INC
40 Rector Street • • New York, New York

BOSTON PHILADELPHIA GREENSBORO CHATTANOOGA
PROVIDENCE SAN FRANCISCO ATLANTA PORTLAND ORE
CHICAGO CHARLOTTE NEW ORLEANS TORONTO

PROPERTY is the fruit of labor; property is desirable; it is a positive good in the world. That some should be rich shows that others may become rich, and hence is just encouragement to industry and enterprise.

Let not him who is houseless pull down the house of another, but let him work diligently and build one for himself, thus by example assuring that his own shall be safe from violence when built.

—ABRAHAM LINCOLN.

March 21, 1864.

EASTWOOD-NEALLEY CORPORATION

At Belleville, New Jersey Since 1877

New York Paper and Pulp Market Review

OPA Issues Directive Prices On No. 1 Mixed and Many Grades of Waste Paper Sold East of Rocky Mountains — Paper and Pulp Markets Strong Under Heavy Demand — Rag Prices Unchanged.

Office of the PAPER TRADE JOURNAL,
Wednesday, September 24, 1941.

A heavy demand for most kinds of paper, with prices firm and the future trend probably upward in some lines, is reflected in reports received this week from many manufacturers' representatives, jobbers, and general paper merchants.

As the armament program continues to expand and mandatory priorities are increasing, trade reports indicate the growing uncertainty of adequate supplies of paper for normal future needs.

Paper production for the week ended September 13 was estimated at 104.0%, compared with 85.2% for 1940, with 92.2% for 1939, with 78.4% for 1938, and with 82.7% for the corresponding week for 1937.

Paper board production for the week ended September 13 was 98.0%, compared with 76.0% for 1940, with 79.0% for 1939, with 71.0% for 1938, and with 70.0% for the corresponding week for 1937.

The price situation in paper is stabilized by the endeavors of the government to prevent a possible rapid inflationary rise. Although the pressure of higher costs would normally result in somewhat higher paper prices under the law of supply and demand, the efforts of the Price Administrator to keep prices from rising too rapidly has, in some instances, forced prices to remain at too low a level. Newsprint prices are stabilized at current quotations through the first quarter of next year but announcement of unchanged prices by leading American and Canadian manufacturers. Leading wrapping paper producers have also voluntarily held prices unchanged for the remainder of this year. Book paper prices, which have been considered too low in some quarters of the trade for sometime, are a little out of line with other items and publication grades are expected to be advanced $5 per ton next month.

In view of the endeavors of the government to check rising prices, it is quite generally believed in the paper market that paper prices will only moderately rise under the stimulus of increasing general business activity, contributed largely by heavy government expenditures.

Newsprint consumption in August aggregating 290,247 tons, was an increase of 5.3% over the like month last year. Canadian shipments to the U. S. for August, 1941, totaled 230,284 tons, compared with 233,159 tons for July and with 232,231 tons for August, 1940, with 168,645 tons for 1939, with 162,149 tons for 1938, and with 245,050 tons for the like month in 1937. Canadian shipments to the U. S. represented 68% of the total newsprint supply.

Chemical Pulp

The chemical pulp market is strong under a heavy demand. No important change from prevailing contract prices has been reported at this date.

Rags

Prices are well maintained in all grades of new and old rags. No important change from average representative market quotations has been reported this week. The roofing grades are somewhat firmer at this date under active mill buying. Prices are unchanged.

Old Rope and Bagging

Old rope prices are firm. The market position of old Manila rope is strong under steady mill buying. Prices on all grades are unchanged at this date.

Old Waste Paper

Late reports indicate that the waste paper market is in a more confused state after the OPA released maximum or ceiling prices on paper stock. The new price schedule, in effect October 1, provides lower prices than the average representative market quotations on most grades prevailing before the new government price schedule was issued. Market opinion at this date is so indefinite that prices are practically nominal. No important price changes have been reported this week.

Twine

Trading is active in most grades of twine. Prices are firm. No important change has been reported since their recent upward revision in soft fiber twine quotations.

Enterprise Plans for Future

S. A. Cohen, head of research for the Paraffine Companies, Inc. Pabco products, and assistant W. S. Egge, have started an extended tour of major industrial centers of the east.

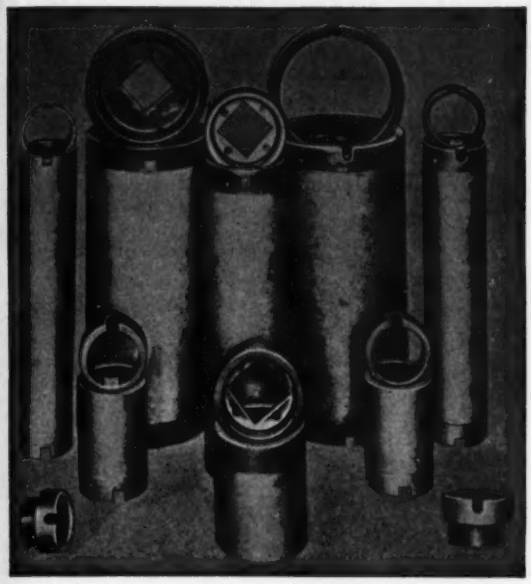
The purpose of the trip is to make an exhaustive search for new products to manufacture when the slack after defense buying sets in. As part of industry's growing plan for future needs, markets are being surveyed, processes of manufacture studied and scientific research is being closely watched.

New materials which can go into the manufacture of more inexpensive, more attractive and useful products will receive the utmost attention. Still in its infancy also is the utilization of waste materials in manufacture. Straws, woods, waste rubber all may some day be converted successfully into products which will keep the wheels of industry turning and men employed.

Schopper Type Instruments Now Made in the U. S. A.

Testing Machines, Inc., are now completely equipped to make these precision type instruments. The factory has installed equipment purchased some time ago for just such a situation and deliveries of these standard testing instruments are now assured.

They are manufacturing the Schopper Type Desk Scale, the Automatic Dead Weight Precision Micrometer, the Schopper Riegler Type Freeness Tester and the Schopper Type Tensile Strength and Elongation Tester.



ELIXMAN

CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

CORES

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.

CORINTH, N. Y.

Good Winders are easy to operate

CAMACHINES are well designed Winders with convenient location of cutters, facilities for quick respacing of cutters, also for easy threading of web. Riding roll and rewind shaft are easily raised and lowered. All controls are handy to the operator. The capacity to produce good rolls is not left to the skill of the operator, but is built into the winder. Write for interesting folder.

CAMERON MACHINE COMPANY

61 Poplar St.

BROOKLYN, N.Y.

Slitting and Roll-Winding Machine Headquarters

MISCELLANEOUS MARKETS

Office of the PAPER TRADE JOURNAL,
Wednesday, September 24, 1941.

BLANC FIXE—Prices on blanc fixe are firm and unchanged and conform to prevailing market levels. The pulp is currently quoted at $35 per ton, in barrels, at works; the powder is currently quoted at $50 per ton, f.o.b., works. Demand reported moderate for the week.

BLEACHING POWDER—Quotations on bleaching powder are firm. Demand reported active for the week. Bleaching powder is currently quoted at $2 per 100 pounds, in drums, at works.

CASEIN—Prices on casein are firm, under a heavy demand for the current week. Standard domestic casein, 20-30 mesh, is currently quoted at 28 cents per pound; 80-100 mesh, at 28½ cents per pound. All prices in bags, car lots. Argentina casein, 20-30 mesh, is currently offered at 28 cents per pound. No quotations on French casein.

CAUSTIC SODA—Quotations on caustic soda are firm and continue unchanged at prevailing market prices. Demand reported active. Solid caustic soda is currently quoted at $2.30 per 100 pounds; flake and ground at $2.70 per 100 pounds, in drums, car lots, at works.

CHINA CLAY—Prices on china clay are firm and conform to pervailing market levels. Demand reported moderate at this date. Domestic filler clay is currently quoted at from $7.50 to $15 per ton; coating clay at from $12 to $22 per ton, at mines. Imported clay is currently offered at from $13 to $25 per long ton, ship side.

CHLORINE—Quotations on chlorine are firm and unchanged. Demand heavy. Market under mandatory priority ruling. Chlorine is currently quoted at $2 per 100 pounds, in single-unit tank cars, f.o.b., works.

ROSIN—The rosin market is reported firm for the week with prices higher on some grades. "G" gum rosin is currently quoted at $2.54 per 100 pounds, in barrels. Savannah "FF" wood rosin is currently quoted at $2.54 per 100 pounds, in barrels, New York. Seventy per cent gum rosin size is quoted at $3.02 per 100 pounds, f.o.b., works.

SALT CAKE—Prices on salt cake are firm and nominal. Demand active. Domestic salt cake is currently quoted at $14 per ton, in bulk; chrome cake at $16 per ton. All prices in car lots, f.o.b., shipping point. The quotation of $16 per ton imported salt cake is nominal.

SODA ASH—Quotations on soda ash are firm and continue to conform to prevailing market levels. Demand reported active for the week. Prices on soda ash in car lots, per 100 pounds, are as follows: in bulk, $.90; in paper bags, $1.05; and in barrels, $1.35.

STARCH—Prices on corn starch are firm and are reported unchanged for the current week. Pearl is currently quoted at $3.10 per 100 pounds; powdered starch at $3.20 per 100 pounds. All prices in bags, car lots, f.o.b., Chicago.

SULPHATE OF ALUMINA—Quotations on sulphate of alumina are firm. Demand reported good for the current week. The commercial grades are currently quoted at $1.15; iron free at $1.85 per 100 pounds. All prices in bags, car lots, f.o.b., works.

SULPHUR—Prices on sulphur are firm and conform to prevailing market levels. Annual contracts are currently quoted at $16 per long ton, f.o.b., mines. Spot and nearby car lots are quoted at $18 per ton.

TALC—Quotations on talc are firm and continue unchanged at prevailing market prices. Domestic talc is currently quoted at from $15 to $21 per ton, at mines. No quotations on imported talc.

MARKET QUOTATIONS

Paper

(Delivered New York)

News, per ton—			
Roll, contract	$50.00	@	—
Sheets	58.00	"	—
Kraft—per cwt.—Delivered Zone A			
Northern, Extra Quality	$5.25	@$6.00	
Superstandard	4.87½	"	5.25
Northern Standard Wrapping	4.50	"	5.00
Standard Wrapping	4.50	"	—
Tissues—Per Ream—Carlots			
White No. 1	1.07½	"	—
White No. 1 M. G.	.97½	"	—
White No. 1½	.85	"	—
White No. 2	.85	"	—
Anti-Tarnish M. G.	.90	"	—
Colored	1.00	"	—
Kraft	.90	"	—
Manila	.80	"	—
Unbl. Toilet, 1 M.	4.14	"	—
Bleached Toilet	5.60	"	—
Paper Towels, Per Case—			
Unbleached, Jr.	3.80	"	—
Bleached, Jr.	2.30	"	—
Manila—per cwt.—C. l. f. a.			
No. 1 Jute	8.75	@10.75	
No. 1 Manila Wrapping, 35 lb.	5.50	"	5.75
No. 2 Manila Wrapping, 35 lb.	5.25	"	5.50
Boards, per ton—			
News	48.00	@	—
Chip	48.00	"	—
Sgl. Mla. Lt. Chip	60.00	"	—
White Pat. Coated	75.00	"	—
Kraft Liners	60.00	"	—
Binders Boards	80.00	"	—

The following are representative of distributors' resale prices:

Rag Content Bonds and Ledgers—White, Assorted Items.

Delivered in Zone 1

	Bonds	Ledgers
100% Rag Ext. No. 1	$39.10@$46.00	$40.25@$47.25
100% Rag	31.05 " 36.50	32.20 " 37.75
85% Rag	.... " ..	29.90 " 35.00
75% Rag	23.60 " 27.75	24.75 " 29.00
65% Rag	.... "	21.65 " 26.25
50% Rag	17.55 " 21.50	18.70 " 22.75
25% Rag	14.65 " 17.75	15.80 " 19.25

Colors at $1.00 cwt. extra.

Sulphite Bonds and Ledgers—White, Assorted Items.

Delivered in Zone 1:

	Bonds	Ledgers
No. 1	$9.35@$11.50	$11.55@$12.75
No. 2	8.50 " 10.25	9.65 " 11.75
No. 3	8.05 " 9.25	9.20 " 11.25
No. 4	7.70 " 9.50	8.90 " 10.75

Colors $1.00 cwt. extra.

Free Sheet Book Papers—White, Cased Paper.

Delivered in Zone 1:

No. 1 Glossy Coated	$11.90	@$13.50
No. 2 Glossy Coated	10.35	" 11.75
No. 3 Glossy Coated	9.55	" 11.00
No. 4 Glossy Coated	9.15	" 10.50
No. 1 Antique (watermarked)	9.05	" 10.50
No. 2 Offset	8.40	" 9.75
A Grade E. F.	8.20	" 9.50
A Grade S. & S. C.	8.45	" 9.75
B Grade E. F.	7.65	" 8.75
B Grade S. & S. C.	7.90	" 9.00
C Grade E. F.	7.35	" 8.50
C Grade S. & S. C.	7.60	" 8.75
D Grade E. F.	7.10	" 8.25
D Grade S. & S. C.	7.35	" 8.50

Ivory & India at $.50 cwt. extra.

Mechanical Pulp

(On Dock, Atlantic Ports)

No. 1 Imported—	
Moist	No prices
Dry	No prices

(Delivered)

No. 1 Domestic and Canadian	40.00	@42.00

Chemical Pulp

(On Dock, Atlantic, Gulf and West Coast Ports)

Bleached Sulphite (Domestic and Foreign)—			
Prime Bleached Sulphite	3.72½	@	4.50
Prime Qualities—			
Easy-Bleaching Sulphite	3.17½	"	4.25
Strong Unbleached Sulphite	3.17½	"	4.25
News Grade, delivered			
Unbleached Sulphite	61.00	"	64.25

(On Dock, Atlantic Ports)

Kraft Bleached	4.12½	"	—
Kraft Light & Strong	No price		
Kraft No. 1	3.60	"	4.75

(F. o. b. Pulp Mill)

Kraft Domestic and Canadian	2.75	"	3.37½

(Delivered)

Soda Bleached	3.30	"	—

Add 60 cents per short ton, dock charges for Albany; $2.50 for Lake Ports East and $3.50 for Lake Ports West of Mackinac Straits.

Domestic Rags

New Rags

(Prices to Mill f. o. b. N. Y.)

Shirt Cuttings—			
New White, No. 1	7.50	@	7.75
Silesias No. 1	4.25	"	4.50
New Unbleached	7.75	"	8.00
Blue Overall	5.00	"	5.25
Fancy	2.50	"	2.75
Washables	2.00	"	2.13
Mixed Khaki Cuttings	2.50	"	2.75
O. D. Khaki Cuttings	3.00	"	3.13

Old Rags

White, No. 1—			
Repacked	3.10	"	3.38
Miscellaneous	2.35	"	2.65
White, No. 2—			
Repacked	2.50	"	2.75
Miscellaneous	2.00	"	2.25
Thirds and Blues—			
Repacked	1.25	"	1.38
Miscellaneous	1.10	"	1.35
Roofing Rags—			
No. 1	1.30	"	1.35
No. 2	1.20	"	1.25
No. 3 (bagging)	.95	"	1.00
No. 4	.90	"	.95
No. 5A	.90	"	.95

Foreign Rags

All prices nominal

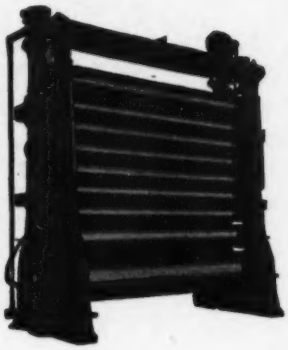
New Rags

New Dark Cuttings	2.25	@	2.40
New Mixed Cuttings	2.00	"	2.30
New Light Silesias	5.50	"	5.75
Light Flannelettes	5.50	"	5.75
New White Cuttings	7.00	"	7.50
New Light Oxfords	4.00	"	4.50
New Light Prints	3.00	"	3.38

Old Rags

No. 1 White Linens	7.50	"	8.50
No. 2 White Linens	6.50	"	7.50
No. 3 White Linens	4.50	"	—

busier? *Then, you'll want to know more about calender stacks that can help you meet your present problems—and help you prepare for those of the future.*



Lobdell Calender Stacks are built, first, to assure the uniformly fine finish required of quality paper; second, to give the efficient, rapid production—long life—and low production and maintenance costs so essential to profitable mill operation, now and in days to come. Complete information on how it fits your production program is yours, without obligation. Just write—

LOBDELL CAR WHEEL COMPANY, Wilmington, Del.

Lobdell Calender Stacks

ROLL GRINDING MACHINES • MICROMETER ROLL CALIPERS • "PURALOY" CHILLED ROLLS

"THERE GOES A MAN WHO HAS JUST SHOWN THIS MILL A WAY TO SAVE REAL MONEY"

● When an Orr Felt representative calls on you, ask him to explain the latest in felt manufacture. Felts **are** being improved . . . and a new Orr felt, correctly specified, may be the means of saving thousands of dollars a year.

For example, Orr pick-up felts are now finished by a special process, and mills using them are bringing their machines up to full speed within the first hour on Monday morning.

Again, makers of carbonizing and condenser papers were baffled by pin holes in the sheet. Now, Orr has solved their problem, developed a new felt to entirely overcome pin holes.

Such are the many cases of Orr advancement. So don't be surprised if an Orr representative shows you how you can make a profitable change in felts. You, too, may someday say, "There goes a man who has just shown this mill a way to save **real** money".

ORR FELTS

THE ORR FELT and BLANKET CO.
PIQUA, OHIO

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.08	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.50	@	4.75
Wool Tares, light....	2.50	"	2.75
Wool Tares, heavy..	2.50	"	2.75
Bright Bagging.....	4.25	"	4.50
Manila Rope—			
Foreign	6.00	"	6.25
Domestic	6.00	"	6.25
Jute Threads.....	4.00	"	4.25
Sisal Strings.....	2.75	"	3.00
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.75	@	4.00
Ordinary Hard White No. 1....	3.25	"	3.50
Soft White No. 1..	2.50	"	2.75
Sott White Extra..	2.70	"	2.85
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag....	1.25	"	1.40
Solid Flat Book...	1.15	"	1.30
Crumbled No. 1	.70	"	.75
Ledger White Stock.	2.30	"	2.45
Ledger Stock Colored	1.75	"	1.90
Manila—			
New Env. Cut....	3.25	"	3.50
New Cuttings.....	3.00	"	3.25
Old Kraft Machine Compressed bales..	2.00	"	2.10
News—			
No. 1 White News	1.50	"	1.60
Strictly Overissue.	.75	"	.80
Strictly Folded....	.65	"	.75
Corrugated	.82½	"	.90
No. 1 Mixed Paper..	.57½	"	.65

Twines

(F. o. b. Mill)

(Soft Fiber)			
Coarse Polished—			
India	.21	@	—
White Hemp.....	.21	"	—
Fine Polished—			
Fine India.....	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers.....	.17	"	—
Tube Rope.....	.19	"	—
Wall Paper.....	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope...	.19	"	—
Cotton	.25	"	—
(Hard Fiber)			
Medium Java.....	.18	"	—
Mex. Sisal.....	.16	"	—
Manila	nominal		

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07¼	@	.07½
New White No. 2.	.04¼	"	.04½
Light Silesias.....	.04½	"	.04¾
Silesias, No. 1....	.04	"	.04¼
Black Silesias, soft	—	"	.03
New Unbleached..	.07	"	.07¼
Washable Prints..	.03	"	.03¼
Washable No. 1..	—	"	.01¾
Blue Overall.....	.04½	"	.05
Cottons—According to grades—			
Washable shredding	—	"	.01½
Fancy Percales....	.03	"	.03¼
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03	"	.03¼
No. 2 Mixed.....	.02	"	.02¼
Corduroy	.01¼	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	1.50	"	1.75
Repacked	1.80	"	1.90
Black Stockings (Export)	Nominal		
Roofing Stock—			
Foreign No. 1....	Nominal		
Domestic No. 1...	1.60	"	1.65
Domestic No. 2...	1.45	"	1.50
Roofing Bagging..	1.30	"	1.40

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	3.50	@	4.25
Domestic	3.50	"	3.75
Manila Rope....	—	"	5.50
Sisal Rope.....	3.50	"	—
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	3.50	"	3.75
No. 2.....	—	"	1.50
Wool Tares, heavy...	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.25	"	3.50

Old Papers

(F. o. b. Phila.)

Shavings—			
Hard White Special	3.75	@	4.00
Hard White.....	3.40	"	3.50
No. 1 Soft White..	2.75	"	2.85
No. 2 White.....	1.90	"	2.00
No. 1 Mixed.....	1.25	"	1.30
Solid Ledger Stock..	2.30	"	2.40
Ledger Stock, white.	2.25	"	2.30
Ledger Stock, colored	2.10	"	2.15
No. 1 Books, heavy..	1.50	"	1.60
Manila Cuttings.....	2.25	"	2.30
Print Manila	.80	"	.90
Container Manila....	.70	"	.75
Kraft Paper.....	2.00	"	2.10
No. 1 Mixed Paper..	.57½	"	—
Straw Board Chip...	.50	"	—
Binders Board Chip..	.50	"	—
Corrugated Board...	1.00	"	1.10
Overissue News.....	.85	"	.90
Old Newspapers.....	.65	"	—

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	3.75	@	4.00
No. 1 Soft White.	2.75	"	3.00
No. 2 Mixed..	90	"	1.00
Solid Ledger Books.	2.25	"	2.50
Overissue Ledger Stock	1.75	"	2.00
White Ledger Stocks	1.50	"	1.65
Mixed Ledgers	1.25	"	—
No. 1 Heavy Books..	1.20	"	1.30
No. 1 Books, Light..	.75	"	.85
Crumpled Stitchless Book Stock	1.25	"	1.35
Manila Env. Cuttings	3.00	"	3.25
Manila Envelope Cuttings, extra quality	3.00	"	3.25
White Blank News..	1.70	"	1.80
No. 1 Kraft.....	2.25	"	2.40
Extra No. 1 Kraft...	2.40	"	2.65
Mixed Papers.....	.65	"	—
Print Manila	.75	"	—
Container Manila....	.65	"	.75
Old Newspapers.....	.70	"	.72½
Paper Wool Strings.	1.30	"	1.35
Overissue News.....	.65	"	.70
Box Board Chips....	.35	"	—
Corrugated boxes....	.90	"	1.00
Kraft corrugated boxes	1.60	"	1.75
New Kraft Corrugated Cuttings....	2.00	"	2.25
Screening Wrappers.	.85	"	.90

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	4.50	@	4.60
Sisal Rope	3.50	"	—
Mixed Rope.....	1.00	"	1.25
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Soft Jute Rope.....	4.75	"	5.00
Manila Rope—			
Foreign	(nominal)		
Domestic	6.00	"	6.25
Jute Carpet Threads.	3.00	"	3.25
Bleachery Burlap....	7.50	"	8.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	4.25	"	—
Scrap Sisal.....	3.25	"	3.50
Scrap Sisal for Shredding	3.25	"	3.50
Wool Tares—			
Foreign	(nominal)		
Domestic	4.00	"	4.25
Aust. Wool Pouches.	4.75	"	5.00
New Burlap Cuttings	5.50	"	5.75
Heavy baling bagging	4.25	"	4.50
Paper Mill Bagging..	3.50	"	3.75
No. 2 Bagging.....	.50	"	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.03
Fancy Percales....	.03¾	"	.04
New White No. 1.	.07¼	"	.07¾
New Light Flannelettes	.05¼	"	.05¾
Canton Flannel, Bleached	.07¼	"	.07½
Underwear Cutters, Bleached	7.25	"	7.50
Silesias No. 1.....	.04¼	"	.04½
New Black Silesias..	.04½	"	.04½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached.....	.07	"	.07¼
Blue Cheviots.....	.04½	"	.04¾
Fancy	.01¾	"	.02
Washable	.01¾	"	—
Cottons—According to Grades—			
Blue Overalls.....	.04¼	"	.04½
New Black, Soft..	.03	"	.03¼
Khaki Cuttings.....	.02¼	"	.02½
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.02	"	.02¼
New Canvas.....	.05½	"	—
B. V. D. Cuttings...	.06¼	"	.07

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	2.75	@	3.00
Miscellaneous	2.00	"	2.25
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	1.75	"	2.00
Old Blue Overalls...	1.60	"	2.00
Thirds and Blues....	1.50	"	—
Miscellaneous	1.25	"	1.35
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.20	"	1.25
No. 2.....	.95	"	1.00
No. 3.....	.85	"	.95

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons.....	(nominal)
Dutch Blues.....	(nominal)
New Checks and Blues	(nominal)
Old Fustians.....	(nominal)
Old Linsey Garments.	(nominal)
New Silesias.....	(nominal)

Waste Men on Defense Committee

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., September 24, 1941—Appointment of 18 men to the Waste Materials Dealers Defense Industry Advisory Committee was announced last week by the Bureau of Clearance of Defense Industry Advisory Committees. Members were selected by Paul C. Cabot, Government Presiding Officer of the committee, following a meeting with members of the industry on September 3.

The committee is as follows: Nat C. Myers, Myers-Lipman Wool Stock Company, Inc., New York City; Milton Linden, Glaser-Yoffee, Inc., Chelsea, Mass.; Ben Chapman, J. Chapman & Sons, Chicago, Ill.; Harry Goldstein, L. Goldstein & Sons, Philadelphia, Pa.; Joseph H. Tyroler, Tyroler Metals, Inc., Cleveland, Ohio; George Birkenstein, George Birkenstein Corporation, Chicago, Ill.; David Dickson, Penn Paper and Stock Company, Philadelphia, Pa.; Sam Hershman, I. Hershman & Co., Inc., New Haven, Conn.; J. V. Spachner, Pioneer Paper Stock Co., Chicago, Ill.; Edward B. Friedlander, The Lowenthal Company, Chicago, Ill.; Herman Muehlstein, H. Muehlstein & Co., Inc., New York City; Erwin M. Desser, Desser Tire and Rubber Company, Los Angeles, Cal.; Joseph Schapiro, S. Schapiro & Sons, Inc., Baltimore, Md.; A. J. Levine, A. Edelstein & Sons, Toledo, Ohio; A. Nicolletti, D. Bennedetto, Inc., New York City; Edward Solomon, Max Solomon Company, Pittsburgh, Pa.; Frank A. Alter, Harry Alter & Sons, Davenport, Iowa; Benjamin Schwartz, Schiavone-Bonomo Corporation, Jersey City, N. J.

Racquette River Buys Fine Apparatus

[FROM OUR REGULAR CORRESPONDENT]

POTSDAM, N. Y., September 22, 1941—The Racquette River Paper Company has purchased a 500-gallon pumper to replace the apparatus demolished last spring in an accident on the Norwood road. The new firefighting apparatus will furnish the concern with increased protection for its mills.

Technical Association of the Pulp and Paper Industry

1916 — 1941

TAPPI

Twenty-fifth Anniversary Supplement

Paper Trade Journal, September 25, 1941

COMPLIMENTS
of
LOCKWOOD TRADE JOURNAL CO. INC.
PUBLISHERS OF
PAPER TRADE JOURNAL

No. 4 White Linens.	2.25	@	3.25
No. 1 White Cotton.	4.25	"	4.75
No. 2 White Cotton.	3.25	"	3.75
No. 3 White Cotton.	2.50	"	3.00
No. 4 White Cotton.	1.90	"	2.20
Extra Light Prints..	2.00	"	2.40
Ord. Light Prints...	1.75	"	2.15
Med. Light Prints...	1.55	"	1.95
Dutch Blue Cottons.	2.25	"	2.50
French Blue Linens.	3.00	"	—
Checks and Blues...	2.00	"	—
Linsey Garments....	1.90	"	2.00
Dark Cottons.....	1.50	"	1.60
Old Shopperies.....	1.30	"	1.45
New Shopperies.....	1.45	"	1.50
French Blues.....	2.25	"	2.50

Old Rope and Bagging

(Prices to Mill, f. o. b. N. Y.)

Gunny No. 1—			
Foreign	Nominal		
Domestic	4.50	@	4.75
Wool Tares, light....	2.50	"	2.75
Wool Tares, heavy..	2.50	"	2.75
Bright Bagging.....	4.25	"	4.50
Manila Rope—			
Foreign	6.00	"	6.25
Domestic	6.00	"	6.25
Jute Threads.....	4.00	"	4.25
Sisal Strings.....	2.75	"	3.00
Mixed Strings.....	1.10	"	1.20

Old Waste Papers

(F. o. b. New York)

Shavings—			
White Envelope Cuttings	3.75	@	4.00
Ordinary Hard White No. 1....	3.25	"	3.50
Soft White No. 1..	2.50	"	2.75
Soft White Extra..	2.70	"	2.85
Flat Stock—			
Stitchless	1.10	"	1.25
Overissue Mag....	1.25	"	1.40
Solid Flat Book...	1.15	"	1.30
Crumbled No. 1 ..	.70	"	.75
Ledger White Stock.	2.30	"	2.45
Ledger Stock Colored	1.75	"	1.90
Manila—			
New Env. Cut....	3.25	"	3.50
New Cuttings.....	3.00	"	3.25
Old Kraft Machine Compressed bales..	2.00	"	2.10
News—			
No. 1 White News	1.50	"	1.60
Strictly Overissue.	.75	"	.80
Strictly Folded....	.65	"	.75
Corrugated	.82½	"	.90
No. 1 Mixed Paper..	.57½	"	.65

Twines

(F. o. b. Mill)

(Soft Fiber)

Coarse Polished—			
India	.21	@	—
White Hemp.....	.21	"	—
Fine Polished—			
Fine India.....	.26	"	—
Unpolished—			
Box	.17¼	"	—
Paper Makers.....	.17	"	—
Tube Rope.....	.19	"	—
Wall Paper.....	.20½	"	—
Wrapping	.23	"	—
Soft Fiber Rope...	.19	"	—
Cotton	.25	"	—

(Hard Fiber)

Medium Java.....	.18	"	—
Mex. Sisal.....	.16	"	—
Manila	nominal		

Jute Carpet Threads.	3.00	"	3.25
Bleachery Burlap....	7.50	"	8.00
Scrap Burlap—			
Foreign	(nominal)		
Domestic	4.25	"	—
Scrap Sisal.....	3.25	"	3.50
Scrap Sisal for Shredding	3.25	"	3.50
Wool Tares—			
Foreign	(nominal)		
Domestic	4.00	"	4.25
Aust. Wool Pouches.	4.75	"	5.00
New Burlap Cuttings	5.50	"	5.75
Heavy baling bagging	4.25	"	4.50
Paper Mill Bagging..	3.50	"	3.75
No. 2 Bagging.....	.50	"	.60

Domestic Rags (New)

(F. o. b. Boston)

Shirt Cuttings—			
New Light Prints.	—	@	.01
Fancy Percales....	.03¾	"	.04
New White No. 1.	.07¼	"	.07¾
New Light Flannelettes	.05¼	"	.05¾
Canton Flannel, Bleached	.07¼	"	.07½
Underwear Cutters, Bleached	7.25	"	7.50
Silesias No. 1.....	.04¾	"	.04½
New Black Silesias..	.04½	"	.04½
Red Cotton Cuttings	.03½	"	.04
Soft Unbleached.....	.07	"	.07¼
Blue Cheviots.....	.04½	"	.04¾
Fancy	.01¾	"	.02
Washable	.01¾	"	—

Cottons—According to Grades—			
Blue Overalls.....	.04¼	"	.04½
New Black, Soft..	.03	"	.03¼
Khaki Cuttings.....	.02¼	"	.02½
O. D. Khaki.....	.02½	"	.03¼
Corduroy	.02	"	.02¼
New Canvas.....	.05½	"	—
B. V. D. Cuttings...	.06¼	"	.07

Domestic Rags (Old)

(F. o. b. Boston)

White No. 1—			
Repacked	2.75	@	3.00
Miscellaneous	2.00	"	2.25
White No. 2—			
Repacked	1.90	"	2.00
Miscellaneous	2.00	"	2.25
Twos and Blues.....	1.75	"	2.00
Old Blue Overalls...	1.60	"	2.00
Thirds and Blues....	1.50	"	—
Miscellaneous	1.25	"	1.35
Black Stockings.....	3.50	"	4.00
Roofing Stock—			
No. 1.....	1.20	"	1.25
No. 2.....	.95	"	1.00
No. 3.....	.85	"	.95

Foreign Rags

(F. o. b. Boston)

Canvas	(nominal)
Dark Cottons.....	(nominal)
Dutch Blues.....	(nominal)
New Checks and Blues	(nominal)
Old Fustians.....	(nominal)
Old Linsey Garments.	(nominal)
New Silesias.....	(nominal)

PHILADELPHIA

Domestic Rags (New)

(Price to Mill, f. o. b. Phila.)

Shirt Cuttings—			
New White No. 1.	.07¼	@	.07½
New White No. 2.	.04¼	"	.04½
Light Silesias.....	.04½	"	.04¾
Silesias, No. 1....	.04	"	.04¼
Black Silesias, soft	—	"	.03
New Unbleached..	.07	"	.07¼
Washable Prints..	.03	"	.03¼
Washable No. 1..	—	"	.01¾
Blue Overall.....	.04½	"	.05
Cottons—According to grades—			
Washable shredding	—	"	.01½
Fancy Percales....	.03	"	.03¼
New Black Soft...	.02½	"	.02¾
New Light Seconds	—	"	.04
New Dark Seconds	—	"	1.50
Khaki Cuttings—			
No. 1 O. D.....	.03	"	.03¼
No. 2 Mixed.....	.02	"	.02¼
Corduroy	.01¾	"	.01½
New Canvas.....	.04½	"	.05
New Black Mixed.	—	"	.02¼

Domestic Rags (Old)

White No. 1—			
Repacked	3.00	@	3.50
Miscellaneous	2.75	"	3.00
Thirds and Blues—			
Miscellaneous	1.50	"	1.75
Repacked	1.80	"	1.90
Black Stockings (Export)	Nominal		
Roofing Stock—			
Foreign No. 1....	Nominal		
Domestic No. 1...	1.60	"	1.65
Domestic No. 2...	1.45	"	1.50
Roofing Bagging..	1.30	"	1.40

Bagging

(F. o. b. Phila.)

Gunny, No. 1—			
Foreign	3.50	@	4.25
Domestic	3.50	"	3.75
Manila Rope.....	—	"	5.50
Sisal Rope.....	3.50	"	—
Mixed Rope.....	.75	"	1.00
Scrap—			
No. 1.....	3.50	"	3.75
No. 2.....	—	"	1.50
Wool Tares, heavy...	4.00	"	4.25
No. 1 New Light Burlap	3.00	"	4.00
New Burlap Cuttings	3.25	"	3.50

Old Papers

(F. o. b. Phila.)

Shavings—			
Hard White Special	3.75	@	4.00
Hard White.....	3.40	"	3.50
No. 1 Soft White..	2.75	"	2.85
No. 2 White.....	1.90	"	2.00
No. 1 Mixed.....	1.25	"	1.30
Solid Ledger Stock..	2.30	"	2.40
Ledger Stock, white.	2.25	"	2.30
Ledger Stock, colored	2.10	"	2.15
No. 1 Books, heavy..	1.50	"	1.60
Manila Cuttings.....	2.25	"	2.30
Print Manila	.80	"	.90
Container Manila....	.70	"	.75
Kraft Paper.....	2.00	"	2.10
No. 1 Mixed Paper..	.57½	"	—
Straw Board Chip...	.50	"	—
Binders Board Chip..	.50	"	—
Corrugated Board...	1.00	"	1.10
Overissue News.....	.85	"	.90
Old Newspapers.....	.65	"	—

BOSTON

Old Papers

(F. o. b. Boston)

Shavings—			
No. 1 Hard White.	3.75	@	4.00
No. 1 Soft White.	2.75	"	3.00
No. 2 Mixed..	90	"	1.00
Solid Ledger Books.	2.25	"	2.50
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White Ledger Stocks	1.50	"	1.65
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Extra No. 1 Kraft...	2.40	"	2.65
Mixed Papers.....	.65	"	—
Print Manila	.75	"	—
Container Manila....	.65	"	.75
Old Newspapers.....	.70	"	.72½
Paper Wool Strings.	1.30	"	1.35
Overissue News	.65	"	.70
Box Board Chips....	.35	"	—
Corrugated boxes....	.90	"	1.00
Kraft corrugated boxes	1.60	"	1.75
New Kraft Corrugated Cuttings....	2.00	"	2.25
Screening Wrappers.	.85	"	.90

Bagging

(F. o. b. Boston)

Gunny Bagging—			
Foreign	(nominal)		
Domestic	4.50	@	4.60
Sisal Rope	3.50	"	—
Mixed Rope.....	1.00	"	1.25
Transmission Rope—			
Foreign	(nominal)		
Domestic	2.75	"	3.00
Soft Jute Rope.....	4.75	"	5.00
Manila Rope—			
Foreign .....(nominal)			
Domestic	6.00	"	6.25

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(PUBLISHERS OF PAPER TRADE JOURNAL)

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FOREWORD

Back in 1915 thirty-five men met and formed the Technical Section of the American Paper and Pulp Association for the purpose of exchanging views and mutual knowledge to advance the art of paper making. It was decided (in 1916) that it would be advantageous to form a separate association, so the Technical Association of the Pulp and Paper Industry was formed. The Association became known as TAPPI and is referred to as such in this supplement.

The growth of TAPPI and its success was startling. Today, 25 years after formation, its membership is about 2000. TAPPI is outstanding in many ways. Its members have written, and there have been printed in the PAPER TRADE JOURNAL, which was selected by TAPPI in 1921 as the medium for the dissemination of the findings of its membership, over THIRTEEN THOUSAND PAGES of technical information of tremendous value to the paper making fraternity. Every paper and every pulp mill has been benefited. This is the voluntary work of 1828 authors in separate articles contributed to the association by its members and represented by 3022 articles. These have been printed in nearly 1100 SEPARATE CONSECUTIVE WEEKLY ISSUES OF PAPER TRADE JOURNAL.

The men who wrote these articles, and who gave unstintingly of their time and knowledge in their preparation, *are your men.*

The value of TAPPI to its industry is world wide in its recognition. This Annual TAPPI Number of PAPER TRADE JOURNAL, September 25, 1941, is a most fitting time and place to honor and thank TAPPI membership as a whole and those members thereof who have devoted so much of their own time to research, preparation, and writing this tremendous amount of informative matter.

TAPPI has been successful, not only in its technical work, but in every other way. Many busy men have given freely of their time to act as officers and committee members.

The handling of its financial affairs is equally outstanding. TAPPI has always been solvent. It has held out a helpful hand, donating many thousands of dollars, to other worthy movements within the industry.

The association of PAPER TRADE JOURNAL with TAPPI, beginning in 1921 and still in effect without a break, has been a pleasant one. The contact of Mr. Henry J. Berger, the editor of PAPER TRADE JOURNAL during all these 20 years, first with the then secretary of the Association, Mr. T. J. Keenan, from 1915 to 1921; then with Mr. W. G. MacNaughton, Secretary from 1921 to 1927; and then with Mr. R. G. Macdonald, from 1927 down to the present moment, has been completely clear of clouds of any kind. Each of the three secretaries of the Technical Association has acted as Editor of the TAPPI section in the weekly issue of PAPER TRADE JOURNAL. Each has worked with the editor of PAPER TRADE JOURNAL in complete harmony.

This is the 25th anniversary year of TAPPI and the 20th anniversary year of PAPER TRADE JOURNAL'S association with the Technical Association of the Pulp and Paper Industry.

Geo. S. Macdonald

President Lockwood Trade Journal Co.
and Publisher of Paper Trade Journal

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Central Paper Company
Fraser Industries, Inc.
Gaylord Container Corporation
Glatfelter, P. H., Company
Kalamazoo Vegetable Parchment Co.
Marathon Paper Mills Company
Neenah Paper Company
New York & Pennsylvania Company
Rayonier Incorporated
River Raisin Paper Company
St. Regis Paper Company
Taggart Corporation
Waldorf Paper Products Company
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The Founding of the Technical Association

In preparing a history of an organization such as the Technical Association of the Pulp and Paper Industry it is necessary to consider a number of events and conditions leading up to its establishment.

In 1908 the U. S. House of Representatives made a thorough investigation of the wood pulp, print paper, etc. industries. Called to testify in these hearings were H. S. Bristol, chief of the Wood Chemistry Section of the Forest Products Laboratory, and Arthur D. Little, the official chemist of the American Paper and Pulp Association.

Dr. Bristol (who is now at the International Paper Company mill at Niagara Falls, N. Y.) stated that he had charge of certain experiments to determine the value of various woods other than those then being used for paper pulp. Dr. Bristol said, in part: "Up to and including the early part of the year 1905 the Forest Service received considerable miscellaneous information concerning the growth of the pulp and paper industry in this country and the tremendous increase in the consumption of wood pulp due to the use of spruce, almost alone for this purpose. Many inquiries were received from people in various parts of the country, some even suggesting that the Forest Service undertake an investigation to determine if other woods could not be used, and so relieve the strain on the supply of spruce. The pressure became so strong and the need of the study so evident that accordingly the Forest Service established a small experimental laboratory in Boston for a preliminary investigation of the subject. The work at the start evidenced great possibilities especially when the statistics of 1905 appeared and showed that the consumption of pulpwood in that year was about 3,192,000 cords, of which 71 per cent was spruce, with an increase in the imports of pulp wood from Canada of 74.8 per cent during the years 1899 and 1905. In this same period the increase in the consumption of wood other than spruce increased 275 per cent. This was one of the points that made the Forest Service believe that the supply of spruce was rapidly diminishing. It was interesting to note that of the lumber cut for 1906 alone at least 15,000,000 cords of slabs and edgings, not including bark and sawdust went to waste. This amount was about four times the total quantity of that used for pulp that year.

"The Forest Service is endeavoring to find a use for some of this material in the paper industry. Aside from the sawmill waste there is a good deal of waste in the form of unutilized species, which in certain localities have little or no value. These include the eastern scrub pine, the white fir of the Pacific Coast, the Engelman spruce of the Rocky Mountains. They occur in large quantities and are cheaper than eastern spruce.

"The Forest Service does not claim that this idea of the utilization of various woods for pulp is new or original. We have heard of basswood and willow being used in the early history of the woodpulp industry. The majority of the experiments that have been tried have dealt with the soda process, and the sulphite process has been but little investigated. A few experiments have been tried with the sulphite process, but these have led to somewhat negative results, because of the excessive cost of using a commercial plant for experimental purposes. This is one reason why the paper trade up to this time has not done more work along this line. However, the results of the studies of the Section of Wood Chemistry of the Forest Products Laboratory have shown that a merchandizable pulp can be made from eleven different species by the sulphite process, seven of these are suitable for news paper without bleaching, the others can be used in other grades of paper when they have been bleached, and in the unbleached state are valuable in the manufacture of wrapping paper, box boards, etc."

In this same hearing the Chairman stated "Reference has been made in the hearings to some investigations carried on by the American Paper and Pulp Association in regard to the use of other materials for paper."

Mr. Chabble, secretary of the A.P.P.A. responded "The Association has been employing for some years Mr. Arthur D. Little as its official chemist, and Mr. Little presented a report at our last annual meeting on February 6, 1908, in which he refers to a number of plants which he suggests as excellent ones containing fibers for making paper.

Mr. Little's report stated in part:

"The most significant development of the year in papermaking has been the serious and general inquiry all over the world for new sources of paper stock. Wood is undoubtedly destined to maintain a position as one of the chief sources of supply for an indefinite number of years, and no possible substitute for groundwood is even in sight. There are, nevertheless, plenty of signs that we are on the eve of a readjustment in papermaking methods. To the growing scarcity of pulpwood, the continual rising price and longer haul with which papermakers using this wood are contending, will in a few years be added the competition of new and better stocks."

Mr. Little then pointed out the possibility of using flax, cotton and

W. H. Swanson
President

R. A. Hayward
Vice President

R. G. Macdonald
Secretary-Treasurer

other agricultural wastes. He also pointed out that there had appeared an unusually large number of books relating to papermaking during the year. These included Andes' "Treatment of Paper for Special Purposes," "The Papermill Chemist" by Stevens, Vols. III and IV of Beadle's "Chapters on Papermaking," the third and enlarged edition of Herzberg's "Papier Prufing," "The Paper Trade" by A. Dykes Spicer and "The Encyclopædia of the Paper Industry" by J. S. Jensen appearing in the Danish journal, *Papier Tidende.*

The foregoing is cited to show the early state of pulp and papermaking technology. The technical approach was being handled for the industry largely by the Government and a private consultants laboratory staff. The need to consider possible sources of raw materials evidently gave technically trained men their first opportunity to serve the industry. A review of the industry's magazines up to the time of the formation of the Technical Association shows that the allied industries were contributing most of the information to the literature in this country although in foreign countries the technical men had attained a foothold in a number of companies. From 1905 on the American industry began to utilize engineers and chemists.

Mr. Obermanns Recollects

In 1929 Henry F. Obermanns wrote to R. G. Macdonald, secretary of TAPPI as follows:

"Previous to 1914 Ernst Mahler and the writer were members of the German Society of Paper and Sulphite Chemists. In June 1914 both of us attended the annual meeting of that organization. During this meeting, Mr. Mahler made a motion, which was seconded by me, that an American Branch Society along the same lines as the already existing Austrian and Scandinavian Branch Societies, be formed in America. The motion was looked upon favorably but the war, which broke out a few weeks later, of course put a stop to any development of this idea. As far as I was concerned, the idea was dormant. Mr. Mahler, however, apparently succeeded in interesting Arthur Hastings, who was at the time president of the American Paper and Pulp Association, who suggested a meeting of a few technical men to bring about a technical organization in the industry.

"Henry Fletcher of Alpena, Mich., took the leadership and brought about the first meeting of what later developed into the Technical Association of the Pulp and Paper Industry."

In the same year Henry Fletcher wrote to the secretary as follows:

"As I remember, it was back in February 1914 that I went before the American Paper and Pulp Association and asked for permission to try and organize the engineers and chemists. Present at that meeting were Arthur Hastings, Frank Moore, Clarence Collins, Chick McDowell, Sam Upton, Doc Campbell and some others.

"Following their approval, I sent out a questionnaire to all the mills to find out how many had men of this type. Following this, we wrote to certain mills and asked them to send representatives. This was where MacNaughton, Obermanns, Mahler and myself came into the picture together. The first meeting was held in Chicago with Tommy Keenan and Professor McKee. If I remember correctly, we worked along at least a year in this manner until we received official recognition in February 1915."

The First Meeting of the Technical Section of the A. P. P. A.

In considering the early history of the Technical Association it is of interest to refer to the original minutes of the first meetings that were held in Room 115 of the Waldorf-Astoria Hotel (5th Avenue at 34th Street, New York, N. Y.). H. H. Bishop, secretary of the Wrapping Paper Division and acting secretary of the American Paper and Pulp Association presided.

Before proceeding with the minutes it is of interest to note the comments made in the address of the president of the A.P.P.A., Frank L. Moore, of Watertown, N. Y., at the annual meeting held on February 18, 1915:

"I am glad to see the interest that is shown in the establishment of a technical division in connection with our association work. An exchange of ideas among practical mill operators through this division should be invaluable. There has been no attempt made in providing the parent organization with funds to take care of this division, so it is left to those who are interested in this, if they wish to meet, to provide the means of handling it by those who are willing to join it, and the information and result of its meetings will be confined to this division and those who contribute to its support."

And from the annual report of the Acting Secretary, H. H. Bishop:

"On September 29, 1914, we presented to the members a plan suggested by one of them to form a new division to be called the Technical Section and whose province would be to gather and disseminate information concerning matters that had to do with actual production. We asked them to express an opinion as to its desirability. To this communication addressed to 250 companies, 68 replies were received, 54 of which were favorable, 7 not interested and 7 undecided.

"As a result of this endorsement of the plan a meeting to form such a division has been scheduled for tomorrow, the 19th, at 10 A.M. in room 115 of this hotel. It has been arranged that the official chemist of the association will make his report at that time, and that two lectures shall be delivered by engineers, one upon the subject of "Power, Light and Heat in Paper Mills," the other on "The Use of Ball Bearings on Paper Machinery." It will be noted that all of these subjects are of deepest interest to both executives and superintendents of mills."

Following are excerpts from the first meeting of the Technical Section of the American Paper and Pulp Association, the forerunner of the Technical Association:

H. H. Bishop: Gentlemen, this is a meeting called for the purpose of discussing the advisability of forming a division of the American Paper and Pulp Association, to be known as the Technical Section, or by

such other name as you may in your wisdom think best. The call was sent out at the suggestion of Henry E. Fletcher of the Fletcher Paper Company, Alpena, Mich., who, in conversation with me on the occasion of the meeting of the Wrapping Paper Division in Chicago, suggested that the existence of something of this kind would be a good thing since it would give to the producing end of the industry the same advantages that are felt to accrue to the executives and sales ends.

It impressed me and it impressed your president, Mr. Moore, as being an excellent suggestion, one for which we were very grateful, and we have taken pains to investigate to see if there was any interest in it, and have been surprised to find how many people felt that such a division was a most desirable thing.

I would suggest that you select someone from your own group to preside on this occasion, and I will take a seat in the back where I can learn something that I do not now know. I will entertain a motion for someone to act as chairman.

Henry W. Stokes: I will nominate Henry Fletcher as chairman of this meeting.

Robert A. D. Ault: I second the motion.

The motion was carried and Henry Fletcher took the chair.

The Chairman: Gentlemen, in talking this matter over this morning with a few people we thought that it would be a good idea to get some medium of exchange for technical ideas. No matter what branch of the industry we may be in we use about the same kinds of processes and machinery.

If we would combine to study papermaking machine design and operation we should be able to uncover a number of ideas that would not only be of value to us as papermakers, but to the manufacturers of papermill machinery, as well. There are many subjects to be considered such as felts, wires, wood, mill chemistry, sizing, power, operations, etc.

We had a very nice meeting here two years ago last December. There were about thirty in attendance to discuss costs. The results were good and later we had a meeting in Chicago which seemed to wake us up to the possibilities of an organization such as this.

Now we had better give some consideration to the manner of organizing. Because of our varied interests we had better consider the advisability of dividing into special sections so that those interested in specific subjects can get together for discussion. We might proceed to collect data through our official chemist and use a publication such as *Paper* or some other trade magazine to publish our reports. Before going ahead I believe that this would be a good time to hear from our official chemist, R. H. McKee, of the University of Maine, who has his official report to the American Paper and Pulp Association ready for presentation.

Professor McKee read his prepared report in which he stressed the need of studying other fibers than those in common use, to meet future requirements for pulp and papermaking. He recommended that studies be made of tamarack, jack pine, Douglas fir, and other wood as well as agricultural waste products such as flax straw, sisal, cotton seed hulls, bamboo and hemp. He dealt with the stream polution problem, sulphite waste liquor, dyes, new pulping processes and bleaching.

R. H. McKee: In asking me to speak before the Technical Section, Mr. Bishop asked me to make suggestions as to what might be accomplished by such a group. Before touching this question, allow me to offer my congratulations to the men who are gathered here. This meeting and the organization of this section, promises to do more toward putting this industry on a sound and paying basis than any previous step taken by the American paper and pulp industry.

It is, moreover, a pleasure to acknowledge that the advance nearest in importance to this, that of interesting American mills to put in cost systems was largely aided by the initiative of the same H. E. Fletcher who suggested to President Moore the formation of this Technical Section of the American Paper and Pulp Association.

It has often been said "that there is active and substantial cooperation in every interest which in any manner touches the production and consumption of paper, except by the manufacturers themselves." The formation of this section promises more toward a change from the condition given in the quotation, if it is a true statement, than any other step that could be taken. Men engaged in the production and scientific phases of mill work have much to gain, at no injury to the mills they represent, by attendance at and discussion in such meetings.

Some subjects which I believe should be taken up at an early date are the following:

1. The manufacturer needs to be able to tell from a sample of a pound or less of pulp what kind of paper it will make, or whether in a given furnish, it will serve to give the desired properties to the paper.

2. Standard definitions for the different grades of bleached and unbleached pulp are needed. Perhaps with this should go a definition for overbleaching, since the evil effects of overbleaching of pulp are but rarely fully appreciated by the pulpmaker.

3. It is possible that a different unit might be used in the purchasing of pulpwood, to the mutual advantage of the buyer and seller. Certainly the mill should buy the wood on the basis of pulp produced and the 128 cubic foot cord does not measure that accurately. The cellulose content varies much with the quality of the wood, especially if calculated on the yield per volume of 128 cubic feet—e.g., sound spruce and balsam fir vary in yield from 16 to 24 per cent. Twenty-five years ago, wood 8 to 18 inches in diameter cost $3.00 per cord at the mill; now, the actual content of the cord is different, in that often one-half of the wood will not be over 3 inches in diameter. Then, there was no need for accurate measurement of the wood, but today wood is expensive and accuracy is needed.

4. A discussion of the manufacture and use of byproducts. The mill dividends appear to be largely linked in the future with the use made of byproducts.

5. Textbooks, testing methods and bibliographies on special subjects of interest to men working in the industry are needed.

The Chairman: You have heard the reading of this report. What is your pleasure?

Mr. Stokes: I would suggest that the secretary be requested to enter the report in the records of the association and further that the attention of the members generally, by letter or otherwise, be called to the fact that this section is started and that they have access to the report made by Professor McKee.

The motion was seconded by W. L. Davis, Jr., and carried.

The Chairman: I think that we should now take up some ideas in regard to the organization of this section. One thought that I had was to get representatives from such divisions as writing, book, wrapping, tissue, cover, specialties, board and pulp and arrange to get together to make further plans. We will not get far in the first year, but we will get better acquainted. We might plan to hold regional meetings at such places as New York, Buffalo and Chicago. We would like to have the advice of Mr. Stokes.

Henry W. Stokes: There is but little that can be accomplished here. I believe that your idea of appointing a committee to study this matter is a good one. You should have as broad a representation as possible both from the standpoint of kinds of paper and papermaking regions.

Those Present at First Meeting

The Chairman: Thank you. If there are no objections. I will discuss the plan of organization with Mr. Moore and will take into consideration the many suggestions that have been received from paper companies. I will then appoint and meet with a small committee to make definite arrangements for the future and get the organization started as soon as possible.

I would like to have Mr. Bishop let us know who are present at this meeting.

Mr. Bishop read the attendance list as follows:

Robert A. G. Ault, Schmidt and Ault Paper Company.
W. W. Goodnow, assistant treasurer, Fort Orange Paper Company.
W. L. Davis, Jr., assistant superintendent, Dells Paper and Pulp Company.
W. H. Savery, president, Shenandoah Pulp Company.
C. C. Emigh, superintendent, York Haven Paper Company.
W. H. Brownell, York Haven Paper Company.
H. P. Carruth, chief chemist, American Writing Paper Company.
Edward E. Lewis, specialist in steam saving devices.
D. L. Bellinger, engineer, Finch, Pruyn and Company.
W. O. Johnson, superintendent, Strathmore Paper Company.
G. S. Veeder, vice president, Pioneer Paper Company.
J. Arthur Hayes, general manager, M. and W. H. Nixon Paper Company.
C. I. McNair, vice president, Northwest Paper Company.
N. K. McNair, superintendent, Northwest Paper Company.
Henry W. Stokes, president, York Haven Paper Company.
J. J. Frank, assistant manager, Ancram Paper Mills.
Henry E. Fletcher, Fletcher Paper Company.
Gerould T. Lane, assistant superintendent, B. D. Rising Paper Company.
Roy Campbell, secretary, Canadian Pulp and Paper Association.
Theodore W. Dunn, vice president and superintendent, Detroit Sulphite Pulp and Paper Company.
Arthur V. Farr, engineer, SKF Ball Bearing Company.
F. Lockwood, engineer, SKF Ball Bearing Company.
H. Newton, Newton Paper Company.
B. Benson, Bulkley, Dunton & Co.
L. M. Alexander, Nekoosa-Edwards Paper Company.
George W. Bayless, Bayless Manufacturing Corporation.

The Chairman: I would now like to have an open discussion for the benefit of our organizing committee.

Mr. Carruth: There are two different aspects which a technical association of this kind should consider. The first is the mechanical side which appears to have greater prominence in today's program. The other is the chemical side. Many subjects will interest both engineers and chemists in the paper mills, but there will be subjects of prime interest to one or the other and I believe that should receive special consideration in the organization plan.

I am personally interested in the chemical side and I know that there are a great many things that an organization of this kind can do that will be of great service. The committee should consult with both engineers and chemists in working out their plan.

The Chairman: That is a good suggestion, Mr. Carruth. In addition to kind of products and regional distribution we will need to consider the needs of the various types of our members—managers, engineers, chemists and superintendents.

Mr. Carruth: Is it not true, Mr. Chairman, that the engineering and chemical problems are about alike irrespective of the kind of product that a mill is making?

The Chairman: That is about right, but I believe that we need to consider our regional distribution of mills and arrange to have meetings in such places as Holyoke and Kalamazoo so that we can encourage the attendance of a great many superintendents who could not afford the time to travel a considerable distance to attend a meeting. Many of the smaller mills could afford to send their men to meeetings only when they are held nearby.

Mr. Stewart: Mr. Chairman, I appear for Clarence I. McNair who had to go to a newsprint meeting and asked me to say to you gentlemen that there had been nothing done by the American Paper and Pulp Association in which he was so much interested as in the formation of this Technical Section. The problems that will be solved by it for his company will be of the greatest economic worth to him. For him, I want to say that you can count on having his earnest advice and any help he can possibly give you.

The Chairman: Please thank Mr. McNair for us. We now have a motion authorizing your chairman to appoint an organizing committee of five.

The motion was seconded and carried.

The Chairman: We will get the committee together and get a report back to you as soon as possible. Mr. Farr of the SKF Ball Bearings Company of Philadelphia is here today to give us a lecture on the application of ball bearings to papermaking machinery. We would be glad to hear from Mr. Farr at this time.

Arthur W. Farr proceeded with his lecture covering the application of ball bearings to barkers, jordans, fourdriniers, cylinder machines, drier rolls, transmission parts and auxiliary equipment.

Mr. Farr said, in part—"Although a great deal has been done in the last three years in applying ball bearings to papermaking machinery, it must be frankly confessed that we are still on the borderland. The applications of ball bearings now in everyday use, however, have convinced manufacturers that the possibilities are enormous and the advantages greater than had first been estimated.

"A decade ago, the use of ball bearings on papermaking machinery was an inventor's dream. Today (1915) ball bearings are a tried and proven reality, already a part of the standard equipment of a number of the larger paper machine manufacturers."

The Chairman: I think we all want to thank Mr. Farr for his most interesting lecture. I believe that this is just one of many subjects that will receive the attention of this Section. He has pointed out the cooperation needed and received from papermills by machinery manufacturers. This cooperation is obtainable and through this Section the results obtained will undoubtedly be made available to our members. By thorough discussions at our meetings the industry will be informed on results and can spend its money more effectively and economically by buying equipment that will do the best job at the least cost and will not have to invest in "lemons" as many have done in the past.

We have another talk today by Mr. Ripley, a consulting engineer, on "Heat, Light and Power in Papermills."

Mr. Ripley: "Gentlemen, in 1914 you spent between 20 and 23 million dollars for heat, light and power. This indicates the magnitude of the engineering phase of your industry and the opportunities that this technical organization has to study ways and means to assure your industry of the optimum uses of this power. For example, a Pennsylvania mill makes a ton of wrapping paper at a total engineering cost of $2.39 while a wrapping paper mill from Connecticut spends $10.46 to make a ton.

The survey which you helped me prepare shows that one New York tissue mill spends $3.84 per ton and another New York tissue mill spends $14.20. A New York board mill is paying $2.39 and a West Virginia mill is paying $4.94. A Wisconsin pulp mill spends $2.15 and a New York pulp mill $5.30. There is room for considerable study on your part to get these figures closer together.

D. D. Kimball, speaking before the A.S.H.V.E. made this comment: "I have heard this claim made many times, and I have come to the conclusion myself, that the steam leaving a boiler might go through an engine and into the heating system without losing any of its efficiency insofar as the heating system is concerned."

Mr. Ripley discussed the relative merits of purchased vs. manufactured power, etc.

The Chairman: Thank you, Mr. Ripley, for all this information. Are there any further comments? If not we will adjourn this meeting and proceed to get ready for the next one to be held in the fall.

Meetings of the Technical Section Organizing Committee

Following the meeting of February 19, 1915, which was attended by about thirty-five and at which a temporary organization was formed for the purpose of launching the new section, there were two meetings of the committee of five appointed by the chairman.

As first named this committee consisted of the Chairman, Henry E. Fletcher of the Fletcher Paper Company, Alpena, Mich.; W. G. MacNaughton, Nekoosa-Edwards Paper Company, Port Edwards, Wis.; Charles F. Rhodes, International Paper Company, Glens Falls, N. Y.; Henry F. Obermanns, Hammermill Paper Company, Erie, Pa.; Ernst Mahler, Kimberly-Clark Corporation, Neenah, Wis., and Ralph H. McKee, University of Maine, Orono, Maine. The latter was a member of the committee by virtue of being the official chemist of the association. The office was abolished at this time and his membership on the committee terminated.

The committee met for the first time on April 6, 1915 in Chicago under the chairmanship of Mr. Fletcher, Mr. MacNaughton acting as secretary, when a constitution was tentatively adopted, and a subcommittee was appointed to confer with the editor of *Paper* regarding the publication of the proceedings. A committee was also named to consider the question of offering prizes for competitive essays and to submit a list of subjects.

In the meantime circular letters had been sent out to the owners of pulp and paper mills throughout the country, accompanied by blanks calling for information regarding the men in charge of technical work, such as details of experience, educational training, positions held, both past and present, etc., and the replies were tabulated and indexed for the use of the Secretary who was yet to be appointed.

A second meeting of the committee was held in Chicago on May 6, 1915 with the president of the American Paper and Pulp Association (Frank L. Moore of Watertown, N. Y.) in the chair. After making some minor changes in the Constitution and adopting the title of Technical Section of the American Paper and Pulp Association as the name of the organization, Henry E. Fletcher was elected Chairman of the Executive Committee with W. G. MacNaughton and Ernst Mahler as associates.

Thomas J. Keenan, editor of *Paper*, was chosen secretary-treasurer and *Paper* was designated as the official journal of the Section. As a committee on publications, Charles F. Rhodes and Henry F. Obermanns were named. The annual dues of members

and associate members were placed at five dollars, each member to be entitled to receive *Paper* as part of the privileges of membership. The following is a summary of the Constitution as finally adopted:

Constitution of the Technical Section

The Technical Section of the American Paper and Pulp Association is an organization of individuals apart from the activities of the parent organization.

Article I. Name: This association shall be called the "Technical Section of the American Paper and Pulp Association."

Article II. Objects: The objects of the section shall be: 1. To stimulate interest in the science of pulp and papermaking; 2. To provide means for the interchange of ideas among its members; 3. To encourage original investigation.

Article III. Membership: There shall be two classes of members: 1. Members; 2. Associate Members.

1. Qualifications for Members: Any person who occupies a position with a member of the American Paper and Pulp Association, who has had a satisfactory technical education or who, though not having had a technical education, has special qualifications and experience.

2. Qualifications for Associate Members: Any person who will assist and support the aims of the Technical Section of the American Paper and Pulp Association, and who, by virtue of his qualifications, is likely to further the work of the Section.

Associate members have all of the privileges of the Technical Section except voting and holding office.

3. Applications: All applications for membership must be made to the Secretary in writing and shall embody a concise statement with dates of the candidate's technical training and experience, and shall be in a form and in such detail as may be prescribed by the executive committee.

4. Election of Members: Each candidate for membership shall be proposed and seconded by members of the Technical Section and shall be voted on by the executive committee of the section, a majority of whose votes shall be necessary for election.

The executive committee shall also decide as to which class of membership the candidate is entitled.

5. Honorary Members: Honorary members may be elected at any time by unanimous vote of the executive committee. They shall have all the privileges of members but without payment of dues.

6. Dues: The annual dues for members and associate members shall be $5.00 payable at the beginning of the calendar year. A member who has not paid his dues at the end of the year shall be suspended.

It was originally proposed to hold the next regular meeting of the Section at Kalamazoo, Mich., early in June, but it was decided at the Chicago meeting to defer this until later in the year, the secretary being instructed meanwhile to get into communication with the mills at that place in order to perfect arrangements.

Writing editorially in *Paper* at this time, Thomas J. Keenan stated—"There is every indication that the Technical Section of the American Paper and Pulp Association will ultimately prove a factor of great importance in the industry. It has long been felt that insufficient attention has been paid to the training of men for technical positions in pulp and paper mills and this is a defect to be remedied. Mill chemists and engineers will be encouraged to communicate the results of their investigations when this can be done without detriment to the manufacturers concerned, and it is hoped by this means to make the regular meetings especially interesting and valuable to all participants."

Second Meeting at the Grand Central Palace

The second regular meeting of the Technical Section was held at the Grand Central Palace in New York City during the National Exposition of the Chemical Industries on September 23, 1915.

In reporting the meeting the PAPER TRADE JOURNAL commented as follows:

"The atmosphere created by the National Exposition of Chemical Industries at the Grand Central Palace during the past week was fitting and inspiring and peculiarly well adapted to assure a successful meeting of the Technical Section of the American Paper and Pulp Association. And the meeting of the latter, which was held on September 23, can be considered in more ways than one, as having been a meritorious and propitious event in the current epoch of papermaking. Perhaps the most valuable benefit resulting from the session is the fact that the need of a body of this kind was realized to a degree surpassing that which has ever yet been conceived.

"The realization of the splendid achievements which might be accomplished by bringing together into one organization the technical brains in the industry, represented by this Section, was represented by the papers that were read and the ideas that were suggested for the general welfare of all those concerned.

"Cooperation and standardization—cooperation in solving the various problems on which its members were laboring, and standardization of chemical tests and mill control—these are two of the needs which have long been sought in the trade, and these are the two functions which the new Section proposes to initiate and perfect as soon as possible.

"There was no lack of enthusiasm throughout the meeting. The attendance was large and representative and the discussions that followed the reading of the various papers was animated and interesting."

The Chairman, Henry E. Fletcher, opened the meeting and introduced Frank L. Moore, President of the American Paper and Pulp Association who analyzed the conditions surrounding the paper trade, and dwelt on the unlimited possibilities which were open to the Technical Section. Mr. Moore said, in part:

"This section of the American Paper and Pulp Association was started at the last annual meeting held in this city in February. At that time there was a committee appointed to prepare preliminary plans and methods under which it might be organized, and your president was given the power to appoint a permanent committee. The committee that was selected at that time was such an excellent one that I made it permanent. This was a good choice, judging from the work which they have done in perfecting the organi-

zation, and bringing it to the position which it now occupies. It is far yet from what it will be, because I predict that the Technical Section will be the strongest, the most important, and the best of any division which may be created by any organization of paper manufacturers in this or any other country. This wonderful exposition of the chemical industries where we are holding our meeting is a remarkable evidence of the scientific development of the country. As these meetings continue from year to year, I predict that they will grow in attendance and interest.

"Your work brings together executives, superintendents, chemists, engineers and other technical men from all lines, kinds and grades of pulp and paper. You are different from any other division of the American Paper and Pulp Association in that respect, and that is why you are so important to the industry as a whole.

"We paper manufacturers compete with foreign trade and therefore must develop the technical side. I know of many mills employing technical men today that would have considered this unnecessary a few years ago. Today, however, those technically trained men are making money for those mills, and that is where the Technical Section is going to help the industry in a way in which the American Paper and Pulp Association could not do with any other division. I am not speaking disparagingly about the work of the other divisions, because the work laid out for them is being handled in an excellent and satisfactory way, but it is a different kind of work.

"You have on your program today papers and discussions by practical men who have "been through the mill" and know what they are talking about. These papers should be thoroughly discussed by you to bring out their full value. At your February meeting there were two or three papers presented and the first time I was in my mill after that my superintendent said "I want to belong to that Technical Section." He insisted on me reading one of these papers and said that it had given him more ideas on that particular subject than anything he has been able to get elsewhere. That is the kind of service that is going to make this Section valuable to the mills.

"I would suggest that we have a committee to which questions on technical subjects, or any questions that might come up in connection with problems that you may be working out in your own mills, can be referred, or have them handled by the Secretary and have him refer them to those best qualified to give information.

"There is another matter which I believe that this Section should handle. That is the question of the standardization of tests on pulps, especially as they effect imported pulps. I believe that the standardization of methods and the adoption of tests for pulps should be developed by this Section.

"There is one other subject that is more to the fore today than any other in the minds of paper manufacturers, and that is the color situation. We need an American dye industry and it will have to be developed by technical men in the United States.

"I am pleased to see so many at this meeting. There will be various committees appointed today whose success depends on the active help given by their members. If you will really do your part you will have an organization that is worth while. I feel sure that when you meet again in February you will have three or four times as many present as you have this morning."

Thomas J. Keenan, as secretary, reported that the membership had increased from 30 in February to 125 in September 1915.

Henry F. Obermanns of the Hammermill Paper Company reported on the recent meeting of the German Association of Cellulose and Paper Chemists and Engineers which he attended. He told about the remarkable progress made in the science and art of papermaking in that country and pointed out how considerable credit for this improvement was due directly to the work of the association.

Otto Kress of the Forest Products Laboratory advocated the standardization of chemical tests and mill control. He outlined the difficulties that were overcome in the leather industry to achieve this, and enumerated many of the benefits that resulted from their adoption. A procedure for considering and establishing standard testing methods followed.

W. G. MacNaughton presented a resolution which was adopted providing that active membership in the Section not be restricted to employees of member companies of the American Paper and Pulp Association.

Upon the adoption of a resolution presented by H. P. Carruth, the chairman appointed the following committees to investigate and report at a future meeting on the methods of analysis for control: Martin L. Griffin of the Oxford Paper Company for soda pulp; Robert B. Wolf of the Burgess Sulphite Fibre Company on sulphite pulp; Otto Kress of the Forest Products Laboratory on sulphate pulp; D. L. Bellinger of Finch, Pruyn & Co. on mechanical pulp and H. P. Carruth of the American Writing Paper Company on papermaking materials.

Martin L. Griffin advocated that means be taken to give the manufacturer of pulp some accurate method of buying wood and deplored the custom of buying by cord measure instead of by weight.

Henry F. Obermanns recommended that a committee be appointed to look into the practicability of starting a bibliography since such information would be of great value to the industry. This was referred to the publication committee.

Presentation of Technical Papers

D. L. Bellinger presented a paper on "Some Experiences in Refining Groundwood Slivers." This was followed by a motion picture showing the mill operation of the District of Columbia Paper Company.

Following a luncheon F. B. Wheeler of the Kimberly-Clark Corporation talked on "A Method of Determining the current capacity of a Cell in an Electrolytic Bleach Plant."

This was followed by a paper by Max Cline of the International Paper Company on "The Possibilities of Accurate Determination of Groundwood in Paper."

H. P. Carruth discussed "The Relation of Ink and Paper in Halftone Printing."

I. F. Stone, president of the National Aniline and Chemical Company was present and commented on the dye situation, a vital subject at the time in view of the scarcity due to European conditions. Up to 1915 European factories supplied about 80 per cent of the dyes used in the American industry. Benzol, the base of aniline colors, cost 75 cents a gallon from American producers although it could be imported from Germany for 20 cents a gallon. Paper blue, produced from toluene made by Americans cost about five dollars per pound and could be imported at a price of 50 cents. He stressed the need of a protective tariff too in order to make these and other dyes in the United States.

The final paper was on "The Elimination of Fuzz in Soda Pulp by Proper Cooking Conditions" by S. D. Wells. In Mr. Wells' absence the paper was read by Otto Kress.

Comment by Paper Trade Journal

Following the meeting the following editorial comment appeared in the PAPER TRADE JOURNAL: "For the past fifteen years there has been a gradually increasing realization that, in order to compete with other nations and to overcome our wasteful methods, we should have to develop the technical side of our industry, as we could no longer rely upon the great advantages of abundant and cheap raw material which we had hitherto enjoyed. Since that time, over a dozen years ago, the leading companies in the industry have gradually paid more attention to the technical side of papermaking, and, in consequence, have established laboratories, not only for the testing of the raw materials which they bought in the open market, but also for the testing out of formulas of their various processes, chemical as well as mechanical.

"By bringing together these forces which relate to the technical side of the industry, the Technical Section of the American Paper and Pulp Association has taken an important step toward putting the industry on a par with any in Europe, and will do much toward improving conditions in our mills, reducing the cost of operation and improving the quality of the product. All these things will make for the betterment of the paper industry as a whole, as the information of all will be exchanged, thus improving conditions in general.

"The open meeting of the Technical Section, held in New York recently, might thus be termed *the beginning of a new era in the American Industry* in which science will take the lead and be our chief resource, instead of abundant raw materials and quantity methods which have heretofore characterized the American papermaking industry."

Meeting of February 16-17, 1916

Preceding the first annual meeting of the section the executive committee met and discussed some proposed changes in the constitution, finances, etc. An interesting feature of the informal proceedings was a discussion of methods of estimating the wet and airdry contents of pulp in wood. The participants included R. B. Wolf, W. G. MacNaughton, K. H. Knudsen, H. K. Moore, M. L. Griffin, Otto Kress, D. L. Bellinger and others. The remarks of Mr. Wolf formed an especially valuable contribution to the knowledge of the subject and led Mr. Griffin to say that many a manufacturer of pulp would have gladly given the amount of his week's expenses at the Waldorf-Astoria to be present and take part in the discussion.

After calling the meeting to order, Chairman Fletcher introduced Dean Hugh P. Baker of the New York State College of Forestry who described forest statistics and conditions in the Empire State.

This was followed by the presentation of a resolution reported by D. L. Bellinger for the committee on the Revision of the Constitution as follows:

Resolved, that the name of this organization be changed from Technical Section of the American Paper and Pulp Association to the Technical Association of the Pulp and Paper Industry.

The motion was seconded by Max Cline and being put to vote was unanimously carried. Mr. Fletcher explained the change in name as necessary in order to keep the organization allied with the parent Association and with other associations constituting the different divisions of the industry in affiliation with the American Paper and Pulp Association.

At this time a resolution proposed by R. B. Wolf providing that officers be eligible for reelection and a resolution proposed by H. P. Carruth as Chairman of the Membership Committee providing for the addition of a junior grade of membership and revising the dues rates were adopted.

President Moore of the A.P.P.A. was present and said "I can see where the practical work is being done and that the practical men are here. This is the best attended meeting I have known since I have been engaged in association work here and I want to congratulate Mr. Fletcher and his associates on preparing a program capable of bringing together so many practical men to meet here and discuss processes, and to exchange ideas that will produce results."

Mr. MacNaughton reported for the executive committee as follows:

"I will say for the executive committee of this year, which we feel has been a year of formation for the Technical Association, that we have been very much encouraged by the response to the opportunity given the technical men of the pulp and paper industry to associate themselves together for mutual interest.

"We feel that the Technical Association of the Pulp and Paper Industry has been started on a firm basis, and we hope that it will grow in importance as well as in numbers and quality, so that as the years go by the Technical Association will be regarded as a high class engineering and technical organization which will not only tend to the quality of the members connected with the industry, but also affect the practical operation of the mills, because, after all, any changes, particularly in the practical mechanical results, are the results used to gauge the success of the association."

Secretary Keenan reported that the membership

had been increased to 207. The income was $1005 and the expenses $706.90.

Chairman Fletcher than introduced Henry W. Stokes who had made the motion the preceding year creating the organization and asked him to tell the gathering what he thought of the results. Mr. Stokes said, in part:

"I think the association is doing pretty well. A year ago there were twenty present and today more than one hundred. Next year we should have many more.

"I have been interested in the paper business a great many years and have done a great deal of work to find short cuts and make more money. It is very interesting work. You will find a very big field, always leading on to something more and better. You shut up one hole then find another which if not shut up will be responsible for a big waste."

H. P. Carruth reported for the committee on methods of testing who announced the following personnel of the subcommittees: Rosin and Rosin Size—Max Cline, R. C. Griffin, C. C. Heritage and C. A. Lunn; Animal Size Stock and Glue—H. P. Carruth, F. W. Farrell and James Murray; Starch and Starch Derivatives—H. P. Carruth, John Traquair and G. M. McNider; Pulp Tests for Physical and Chemical Qualities—R. S. Hatch, Sidney E. Lunak and L. H. Shipman; Fillers—Max Cline, James Murray and Alexander W. Macvie; Chemicals—Max Cline, H. J. Skinner and J. D. Rue; Colors, Dyes and Pigments—R. S. Hatch, Otto Schutz (O. T. Chalon), Ludwig Strepp; Rag Moisture Test—R. S. Hatch; Rag half-stuff—H. P. Carruth and Coating Materials—Max Cline and E. Sutermeister.

Ernst Mahler, speaking on the scarcity of dyestuffs said:

"The most important question facing us today is the dyestuff situation. You have all read a very interesting article regarding the sale of fake dyestuffs at the present time, and I think that everyone here can tell his own story about this kind of business of mixtures of yellow ochre and chrome paint, etc.

"We are, today, having more dyestuffs offered in one week than was previously imported in six months. It would be a good idea if some of the members with laboratories in the east would give us some definite information concerning the character of the dyestuffs on the market at the present time and also to keep us posted about the progress that the American dyestuff industry is making. It is time to come down to facts."

Mr. MacNaughton suggested that a committee on dyestuffs be appointed. In this connection Mr. Mahler said:

"My idea is not so much, at the present time, to determine standard methods of testing, because there really is nothing to be tested since there is nothing available. I rather thought that some men like Mr. Schutz (O. T. Chalon) and Mr. Strepp, of our association, who are recognized authorities on dyestuffs, might keep this organization informed on progress, and perhaps give inside details of what might be of value to us, especially as to where we should keep our hands off. We are scattered all over the country, and I personally try to keep track of the dyestuff situation because I was formerly connected with the industry, but when I came to New York I found that I have overlooked a great deal, and that gave me an idea of proposing this committee."

The Chairman thanked Mr. Mahler and immediately appointed Otto Schutz chairman of a committee to investigate the production and sale of adulterated dyestuffs, naming Ludwig Strepp and H. K. Moore, as associates.

Otto Kress as chairman of the nominating committee then presented its selection of a slate of officers. These were: President—Henry E. Fletcher; Vice President—W. G. MacNaughton; Secretary-Treasurer—Thomas J. Keenan; Executive Committee—Charles F. Rhodes (1 year), Henry F. Obermanns (2 years) and Ernst Mahler (3 years). These candidates were unanimously elected.

In the afternoon a group of technical papers were presented as follows:

"Some Methods for the Study of Beating," by Arthur B. Green, S. D. Warren Company.

"Proper Reforestation" by Ralph H. McKee, University of Maine.

"The Crane System of Regulating the Heat of Driers" by J. O. Woodson, Crane Company.

"The Operation of Tumbling or Drum Barkers" by Herbert Guettler, American Barking Drum Company. (Paper read by Mr. MacNaughton in Mr. Guettler's absence).

"A Protective Device for Paper in Rolls" by F. R. Misegades.

"A Paper Problem at the Pulp and Paper School of the University of Maine" by J. N. Stephenson, University of Maine.

Members of the Technical Association in 1916-17

The following list of the members of the Technical Association of the Pulp and Paper Industry in 1916-1917 is given since at this time the organization had found itself and was beginning to accomplish good results. The company connections refer to these early years.

Members

Bacon, Charles B., assistant chemist, Bureau of Standards, Washington, D. C.

Bagg, John L., clerk, Parsons Paper Company, Holyoke, Mass.

Baker, Hugh P., dean, N. Y. State College of Forestry at Syracuse University, Syracuse, N. Y.

Barker, E. R., chemical engineer, 79 Milk street, Boston, Mass.

Barlow, Cone, engineer, Munising Paper Company, Munising, Mich.

Behrend, Ernst R., president, Hammermill Paper Company, Erie, Pa.

Bellinger, D. L., engineer, Finch, Pruyn & Company, Glens Falls, N. Y.

Berger, O. L., superintendent, Nekoosa Edwards Paper Company, Port Edwards, Wis.

Beveridge, F. Norman, general superintendent, Dryden Timber and Power Company, Ltd., Dryden, Ont., Canada.

Bowers, John A., chief chemist, Hammermill Paper Company, Erie, Pa.

Brassington, John W., efficiency engineer, Pusey & Jones Company, Wilmington, Del.

Bray, Paul DeC., chemist, Katahdin Pulp and Paper Company, Lincoln, Me.

Bright, Charles G., chemist, Kimberly-Clark Company, Neenah, Wis.

Buck, Lucien, purchasing engineer, Eastman Kodak Company, Rochester, N. Y.

Bullard, H. F., chemist, Laurentide Company, Ltd., Grand Mere, P. Q., Canada.

Caldwell, Winthrop E., efficiency engineer, American Writing Paper Company, Holyoke, Mass.

Carey, James L., paper mill architect and engineer, 208 N. Laramie avenue, Chicago, Ill.

Carruth, Henry P., chief chemist, American Writing Paper Company, Holyoke, Mass.

Clark, Fred. C., Paper Laboratory, Bureau of Standards, Washington, D. C.

Clark, Gilbert L., chemist, Emerson Laboratory, Springfield, Mass.

Cline, Max, chemist, Bureau of Tests, International Paper Company, Glens Falls, N. Y.

Cronkhite, W. W., commercial engineer, General Electric Company, Schenectady, N. Y.

Cunningham, John H., Laurentide Company, Ltd., Grand Mere, P. Q., Canada.

Curtis, Frederick A., chemist, Aetna Paper Company, Dayton, Ohio.

Davis, John F., superintendent, Beckett Paper Company, Hamilton, Ohio.

Davis, Merritt J., chemist, Taggard Bros. Paper Company, Watertown, N. Y.

Davis, W. L., Jr., assistant superintendent, Dells Paper and Pulp Company, Eau Claire, Wis.

DeCew, J. A., chemical engineer, 903 McGill Bldg., Montreal, Que., Canada.

Dickerson, Walter H., manager and secretary, Muskegon Extract Company, Muskegon, Mich.

Douglass, Harry E., chemist, Fletcher Paper Company, Alpena, Mich.

Drake, C. W., industrial engineer, Westinghouse Electric and Manufacturing Company, Chicago, Ill.

Emerson, Herbert C., president, Emerson Laboratories, Springfield, Mass.

Farrell, Frederick W., chemist, Ideal Coated Paper Company, Brookfield, Mass.

Fletcher, Henry E., secretary and general manager, Fletcher Paper Company, Alpena, Mich.

Fletcher, Philip K., foreman, bleach and electrolytic departments, Pennsylvania Salt Mfg. Company, Wayandotte, Mich.

Forrester, George W., beater engineer, American Writing Paper Company, Holyoke, Mass.

Frank, J. J., assistant manager, Ancram Paper Mills, 136 West 21st street, New York.

Franke, K. W., chemist, Hinde & Dauch Paper Company, Sandusky, Ohio.

French, Hobert W., chemist, Tileston & Hollingsworth Company, Hyde Park, Mass.

Gleason, E. P., assistant engineer, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

Gleason, G. H., chemical engineer, 141 Milk street, Boston, Mass.

Green, Arthur B., industrial engineer, S. D. Warren, Cumberland Mills, Me.

Griffin, Martin L., manager of chemical and electrochemical departments, Oxford Paper Company, Rumford, Me.

Griffin, Roger C., chief analyst, Arthur D. Little, Inc., 93 Broad street, Boston, Mass.

Gschwender, Ernst, draftsman and engineer, Detroit Sulphite Pulp and Paper Company, Detroit, Mich.

Guettler, Herbert, manager, American Barking Drum Company, 601 Monadnock Building, Chicago, Ill.

Guild, Henry J., research manager, Eastern Manufacturing Company, Bangor, Me.

Hafele, J. Ernest, chemist, Robert Gair Company, Brooklyn, N. Y.

Hall, Keppele, engineer in charge of Taylor System of Scientific Management, Eastern Manufacturing Company, Bangor, Me.

Hammond, H. B., sales engineer, Westinghouse Electric and Manufacturing Company, 165 Broadway, New York.

Hartman, August F., office foreman, George F. Hardy, 309 Broadway, New York.

Hatch, Raymond S., general superintendent, Crocker McElwain Company, Holyoke, Mass.

Haynes, Edward A., general manager, Port Huron Paper Company, Port Huron, Mich.

Hedden, Morris W., chemical engineer, Crown Willamette Paper Company, West Linn, Ore.

Hedin, Joseph E., manager, Jessup & Moore Paper Company, Wilmington, Del.

Heiskenan, Jalmar E., designing engineer, The Moulton Engineering Corporation, Portland, Me.

Hockley, Claude C., manager of manufacturing, St. Maurice Paper Company, Cap Magdeleine, P. Q., Canada.

Hyatt, Frank R., in charge of mechanical testing,

Bureau of Tests, International Paper Company, Glens Falls, N. Y.

Jenssen, G. D., consulting engineer, G. D. Jenssen Company, 200 Fifth avenue, N. Y. C.

Jenssen, J. D., consulting engineer, G. D. Jenssen Company, 200 Fifth avenue, N. Y. C.

Jones, Edward A., E. D. Jones & Sons Co., Pittsfield, Mass.

Keenan, Thomas J., editor of "Paper," 117 East 24th street, New York.

Kent, Charles H., chemist, Vera Chemical Company, Stoneham, Mass.

Ketchen, W. L., construction engineer, Riordon Pulp and Paper Company, Ltd., Hawkesbury, Ont., Canada.

Kleiner, Dr. E. G., chemical engineer, 98 Maiden Lane, New York.

Knudsen, K. Hv., chemical engineer, 98 Maiden Lane, New York.

Kress, Otto, in charge of section of pulp and paper, Forest Products Laboratory, Madison, Wis.

Lauroesch, Hugo V., Defiance Paper Company, Niagara Falls, N. Y.

Little, Arthur D., chemist, Arthur D. Little, Inc., 93 Broad street, Boston, Mass.

Low, Emile R., assistant production manager, Beaver Board Company, Buffalo, N. Y.

Lunak, S. E., chemist, Forest Products Laboratory, Madison, Wis.

Lunn, Charles A., technical director, Central Naval Stores Company, 175 Front street, New York.

McDowell, Charles, president, McDowell Paper Mills, Manayunk, Pa.

McIntyre, A. G., general manager, Mattagami Pulp and Paper Company, Toronto, Canada.

McKee, George M., general manager, Donnacona Paper Company, Ltd., Donnacona, Que., Canada.

McKee, Ralph H., director of pulp and paper school, University of Maine, Orono, Me.

McNaughton, George C., engineer in forest products, Forest Products Laboratory, Madison, Wis.

MacDiarmid, Archibald A., chief engineer, Mattagami Pulp and Paper Company, Toronto, Can.

MacNaughton, W. G., in charge of manufacturing, Nekoosa-Edwards Paper Company, Port Edwards, Wis.

MacNider, George M., chemist, Corn Products Refining Company, 17 Battery Place, New York.

Macvie, Alex. W., chemist and expert, Bryant Paper Company, Kalamazoo, Mich.

Mahler, Ernst, assistant general superintendent, Kimberly-Clark Company, Kimberly, Wis.

Mason, J. O., manager of manufacturing, Laurentide Company, Ltd., Grand Mere, P. Q., Canada.

Matheson, Einar, efficiency engineer, St. Croix Paper Company, Boston, Mass.

Maxwell, Orin P., chemist, West Virginia Pulp and Paper Company, Luke, Md.

Mead, George H., president, Mead Pulp and Paper Company, Dayton, Ohio.

Millspaugh, W. H., Sandusky Foundry and Machine Company, Sandusky, Ohio.

Moe, Carl, chemist, Louisiana Fibre Board Company, Bogalusa, La.

Moore, Edward T., engineer, Westinghouse Electric and Manufacturing Company, 930 University Bldg., Syracuse, N. Y.

Moore, Hugh K., chief chemist and chemical engineer, Berlin Mills Company, Berlin, N. H.

Morrison, Freeland J., chemist, Oxford Paper Company, Rumford, Me.

Morse, E. S., commercial engineer and salesman, Westinghouse Electric and Manufacturing Company, Boston, Mass.

Murray, James, chemist, Nashua Gummed and Coated Paper Company, Nashua, N. H.

Nixon, William L., general superintendent, Chemical Paper Manufacturing Company, Holyoke, Mass.

Nunez, Vasco E., research chemist, Arthur D. Little, Inc., 93 Broad street, Boston, Mass.

Oberdorfer, Max, engineer and chemist, Central Paper Company, Muskegon, Mich.

Obermanns, Henry F., assistant to president, Hammermill Paper Company, Erie, Pa.

Outterson, J. A., president, Carthage Sulphite Pulp and Paper Company, Carthage, N. Y.

Patrick, Stephen E., S. D. Warren Company, Westbrook, Me.

Paulson, P. A., superintendent of sulphite mill, Kimberly-Clark Company, Neenah, Wis.

Prather, H. B., Cleveland, Ohio.

Rausch, Roswell H., engineer, bureau of tests, International Paper Company, Rumford, Me.

Rhodes, Charles F., superintendent, bureau of tests, International Paper Company, Glenns Falls, N. Y.

Richardson, Wilbur P., assistant superintendent and chemist, Hinckley Fibre Company, Hinckley, N. Y.

Ripley, C. E., consulting engineer, 110 West 40th street, New York.

Robertson, Reuben B., general manager, Champion Fibre Company, Canton, N. C.

Robertson, W. F., co-partner, E. C. Robertson & Son, Hinsdale, N. H.

Rothschild, Henry A., chemist, Kimberly-Clark Company, Neenah, Wis.

Rue, John D., professor, University of Michigan, Ann Arbor, Mich.

Sanburn, Justus C., chemist Strathmore Paper Company, Mittineague, Mass.

Schenck, Jr., Garrett, in charge of Testing and Economy Work, Great Northern Paper Company, Millinocket, Me.

Schutz, Otto, paper and pulp expert, Badische Company, 128 Duane street, N. Y. C.

Scott, Douglas E., assistant chemist and experimen-

tal papermaker, A. D. Little, Inc., 93 Broad street, Boston, Mass.
Scott, Frank O., superintendent, Southworth Company, Mittineague, Mass.
Sherman, George C., president, Taggart Paper Company, Sherman Building, Watertown, N. Y.
Shipman, L. H., in charge of bleaching and chemical departments, Burgess Sulphite Fibre Company, Berlin, N. H.
Skinner, Hervey J., vice president, Arthur D. Little, Inc., 93 Broad street, Boston, Mass.
Smith, Daniel A., vice president and general manager, District of Columbia Paper Manufacturing Company, Washington, D. C.
Spierling, Arthur O., assistant mechanical engineer, Hammermill Paper Company, Erie, Pa.
Standish, John C., assistant superintendent, F. C. Huyck & Sons, Albany, N. Y.
Steffanson, G. B., consulting engineer, Fox Paper Company, Lockland, Ohio.
Stephenson, J. N., professor of chemistry, University of Maine, Orono, Me.
Strachan, J. R., chemist, Canada Paper Company, Ltd., Windsor Mills, P. Q., Canada.
Strepp, L., superintendent, Badische Company, 128 Duane street, New York.
Surface, Henry E., engineer in forest products, Forest Products Laboratory, Madison, Wis.
Sutermeister, Edwin, chief chemist, S. D. Warren and Company, Cumberland Mills, Me.
Sutherland, D. Manson, manager, Agasote Millboard Co., Trenton, N. J.
Taylor, Howard S., engineer, Lake Superior Paper Company, Ltd., Sault Ste. Marie, Ont., Canada.
Thorne, C. B., mechanical engineer and chemist, Riordon Pulp and Paper Company, Ltd., Hawkesbury, Ont., Canada.
Thue, Jens, sulphite engineer, C. Bache-Wiig, Portland, Me.
Traquair, John, vice president and manager, Feculose Company of America, Ayer, Mass.
Vestesen, Borge, chemist, St. Croix Paper Company, Woodland, Me.
Wallace, William L., mechanical engineer, Manitowoc Engineering Works, Manitowoc, Wis.
Wardle, Edward B., chief engineer, Laurentide Company, Ltd., Grand Mere, P. Q., Canada.
Weber, W. A. O., special instructor, American Writing Paper Company, Holyoke, Mass.
Wells, Sidney D., engineer in forest products, Forest Products Laboratory, Madison, Wis.
Wheeler, F. G., chemical engineer, Kimberly-Clark Company, Neenah, Wis.
Whitney, William A., manager, Emerson Paper Company, Wendell, N. H.
Williamson, George E., chief engineer, Strathmore Paper Company, Mittineague, Mass.
Winslow, Carlile P., engineer in forest products, Forest Products Laboratory, Madison, Wis.
Wolf, Robert B. manager of manufacturing, Burgess Sulphite Fibre Company, Berlin, N. H.
Wood, Walter H., testing engineer, American Writing Paper Company, Holyoke, Mass.
Wyman, G. R., manufacturing manager, Bird & Son, E. Walpole, Mass.

Associate Members

Andrews, D. C., superintendent of sulphite mill, Northwest Paper Company, Cloquet, Minn.
Baker, W. E. B., chief chemist, York Haven Paper Company, York Haven, Pa.
Beadle, Warren E., superintendent, Biron Mill, Grand Rapids, Wis.
Bertschy, R. D., vice president, Miamisburg Paper Company, Miamisburg, Ohio.
Bishop, Henry H., secretary, Wrapping Paper Manufacturers Association, 18 East 41st street, New York City.
Boyd, Charles S., manager, Appleton Coated Paper Company, Appleton, Wis.
Bradley, P. D., superintendent, Defiance Paper Company, Niagara Falls, N. Y.
Brooksbank, C. B., superintendent, Cherry River Paper Company, Richwood, W. Va.
Brownell, W. H., mechanical engineer, York Haven Paper Company, York Haven, Pa.
Campbell, William J., superintendent of groundwood department, Northwest Paper Company, Cloquet, Minn.
Carrigan, J. F., chief engineer, Nekoosa-Edwards Paper Company, Port Edwards, Wis.
Carroll, John F., general superintendent, Inland Empire Paper Company, Millwood, Wash.
Coffin, Arthur D., president, C. H. Dexter & Sons, Inc., Windsor Locks, Conn.
Corcoran, J. C., salesman, Rice, Barton & Fales Machine and Iron Foundry Company, Worcester, Mass.
Cosler, Arthur S., sulphite superintendent, Marathon Paper Mills Company, Rothschild, Wis.
Dore, Edward A., chemist, Bathurst Lumber Company, Ltd., Bathurst, N. B., Canada.
Dorman, Edward O., sales manager, Champion Coated Paper Company, 291 Broadway, New York.
Dunn, Theodore W., vice president, Detroit Sulphite Pulp and Paper Company, Detroit, Mich.
Eilers, Frank B., manager, Standard Chemical Company, Kalamazoo, Mich.
Eliason, Harry D., assistant manager, Geo. F. Shevlin Manufacturing Company, Saratoga Springs, New York, N. Y.
Everest, D. C., secretary and general manager, Marathon Paper Mills Company, Rothschild, Wis.
Ferguson, George K., chemist, Watervliet Paper Company, Watervliet, Mich.
Fishburn, Victor Earl, chemist, Watab Pulp & Paper Company, Sartell, Minn.
Fisk, Ira T., superintendent, Stevens & Thompson, North Hoosick, N. Y.
Goldschmidt, David J., secretary to general manager, Crown Willamette Paper Company, San Francisco, Cal.

Goodell, E. G., general manager, Louisiana Pulp and Paper Company, Braithwaite, La.
Goodnow, W. W., assistant treasurer, Fort Orange Paper Company, Castle-on-Hudson, N. Y.
Gordon, Forest C., chemist, Richardson Paper Company, Lockland, Ohio.
Hall, Emmett A., secretary-treasurer, Glens Falls Machine Works, Glens Falls, N. Y.
Helseth, S. T., pulp and paper student, Oxford Paper Company, Rumford, Me.
Heritage, C. C., chemical engineer, Nekoosa-Edwards Paper Company, Port Edwards, Wis.
Holmes, George S., general manager, Yellow Pine Paper Mill Company, Orange, Texas.
Howard, Guy C., chemical engineer, Howard Pulp Process Company, Montclair, N. J.
Howell, W. H., Jr., superintendent, New York and Pennsylvania Company, Willsboro, N. Y.
Huyck, Edmund N., president, F. C. Huyck & Sons, Albany, N. Y.
Johnson, Wilhelm O., superintendent, Strathmore Paper Company, Woronoco, Mass.
Kennedy, Archie J., superintendent, Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.
Klund, Frederic P., assistant secretary and mechanical engineer, Hammermill Paper Company, Erie, Pa.
Lansing, Stuart D., president, Bagley & Sewall Company, Watertown, N. Y.
Lawrence, W. J., manager, Western Paper Makers Chemical Company, Kalamazoo, Mich.
Lincoln, Winslow S., engineering and sales departments, Rice, Barton & Fales Machine and Iron Foundry Company, Worcester, Mass.
Lippincott, Wilmot C., assistant sulphite superintendent, Cherry River Paper Company, Richwood, W. Va.
McDonnell, Edward J., Jr., superintendent, Tileston & Hollingsworth Company, Mattapan, Mass.
McNair, C. I., Jr., assistant to general manager and superintendent, Northwest Paper Company, Cloquet, Minn.
Mann, F. A. L., beater engineer, Hammermill Paper Company, Erie, Pa.
Moore, Charles F., secretary, bureau of statistics, Book Paper Manufacturers, Vanderbilt Hotel, New York, N. Y.
Moore, Frank L., president, Newton Falls Paper Company, Watertown, N. Y.
Murphy, Thomas R. H., construction engineer, Bathurst Lumber Company, Ltd., Bathurst, N. B., Canada.
Murray, Edward B., vice president, Union Bag and Paper Company, 233 Broadway, New York, N. Y.
Murray, Milton, superintendent, Agawam Div., American Writing Paper Company, Mittineague, Mass.
Naylor, Alexander D., secretary-treasurer, American Paper and Pulp Association, 18 East 41st street, New York.
Nevius, A. H., general manager, Miami Paper Company, West Carrollton, Ohio.
Pagenstecher, Felix, secretary and manager, Riverview Coated Paper Company, Kalamazoo, Mich.
Parant, Leo J., general superintendent, St. Croix Paper Company, Woodland, Me.
Patch, Clifford, chemist, Orono Pulp and Paper Company, Bangor, Me.
Patterson, D. H., Jr., superintendent, California Paper and Board Mills, Antioch, Cal.
Robinson, W. T., general manager, Parsons Pulp and Lumber Company, Parsons, W. Va.
Schneider, Carl, in charge of colors and coloring of paper, Knowlton Bros., Watertown, N. Y.
Sheahan, Edward, superintendent, Abitibi Power and Paper Company, Iroquois Falls, Ont., Canada.
Simon, Maurice W., secretary and manager of sales, Tonawanda Board and Paper Company, Tonawanda, N. Y.
Smith, Leonard E., superintendent, Nekoosa-Edwards Paper Company, Port Edwards, Wis.
Snell, Ralph M., manager, Paper Makers Chemical Company, Holyoke, Mass.
Sprang, Rudolph J., assistant superintendent, Champion Fibre Company, Canton, N. C.
Steele, George F., secretary, Newsprint Manufacturers Association, 18 East 41st street, New York City.
Strange, Hugh, secretary-treasurer, John Strange Paper Company, Menasha, Wis.
Straus, Raymond I., secretary, Bedford Pulp and Paper Company, Richmond, Va.
Taylor, H. W., vice president, Dill & Collins Company, Philadelphia, Pa.
Taylor, John M., manager, Diamond State Fibre Company, Bridgeport, Pa.
Uptegraff, T. M., secretary and treasurer, Defiance Paper Company, Niagara Falls, N. Y.
Van Alstyne, John, superintendent of sulphite department, Rhinelander Paper Company, Rhinelander, Wis.
Wagg, James B., assistant superintendent, Strathmore Paper Company, Woronoco, Mass.
Walker, Harold E., assistant manager and superintendent, John S. Moore & Son, Bellows Falls, Vt.
Warren, Francis W., consulting engineer, Brownville Paper Company, Brownville, N. Y.
Wilson, John H., hydro-electric engineer and superintendent of power, Berlin Mills Company, Berlin, N. H.
Woodruff, J. B., purchasing department, American Writing Paper Company, Holyoke, Mass.
Yoerg, L. M., superintendent, Carew Manufacturing Company, South Hadley Falls, Mass.
Zimmerman, Max, superintendent, Mac Sim Bar Paper Company, Otsego, Mich.
Zimmermann, Carl J., president, St. Lawrence Talc Company, 7 East 42nd street, New York, N. Y.

Junior Members

Coughlin, Edward Thomas H., chemist and chemical engineer, Monarch Paper Company, Kalamazoo, Mich.
Holbrook, Ralph A., chemical engineer, Great Northern Paper Company, Millinocket, Me.
Rieser, Charles W., chemist, American Writing Paper Company, Holyoke, Mass.

The Presidential Administrations

Twenty-four large volumes of *Technical Association Papers* have been published giving in detail the story of the activities and accomplishments of the association since it was organized. For the purpose of this review only the highlights of the association's history will be mentioned and considered in terms of the administrations of the various presidents of the organization. In the historical record concerning the founding of the association considerable information is given in regard to the contribution made by Harry Fletcher. It will therefore not be reviewed further here.

Harry P. Carruth and W. G. MacNaughton

William G. MacNaughton was elected to the presidency in 1917 but since he transferred his activities from the Nekoosa-Edwards Paper Company in Port Edwards, Wis., to the Inland Empire Paper Company in Spokane, Wash., soon thereafter, he resigned and was replaced by Harry P. Carruth of the American Writing Paper Company who served in 1917 and 1918 and was one of the founders of the association. Henry F. Obermanns of the Hammermill Paper Company was vice president.

In response to a request from the secretary to point out some of the outstanding events of 1917-1918 Mr. Carruth wrote as follows:

"I find that the intervening twenty odd years since I was president somewhat obscures the recollection of details. I recall, however, the definite impression of the youth of the Technical Association in contrast with the older organizations of the industry, and the consequent more or less paternalistic attitude of the other associations. The association was then as now, but perhaps militantly then, an organization of individuals most of whom were rather young and their functions in the industry much less well established than is now the case. It was always more or less a struggle to maintain this independence and separate entity of TAPPI than is now conceivable.

"It was during this period that the initial work on the preparation of text books was first undertaken. Our income in those days was quite modest, and an undertaking such as the text books was in consequence a considerable problem. Above everything else, I remember the wonderful enthusiasm and good fellowship which was so much in evidence at our meetings.

"The relatively small membership at that time permitted intimacy of acquaintanceship no longer possible. My recollection is that our winter meetings were then held in the old Waldorf, and that the two fall meetings, during my administration, were held respectively at Holyoke, Mass. and Dayton, Ohio. There is a similarity between those years and the present time. We were arming then as we are today, problems of priority, problems arising out of scarcity of raw materials were much in people's minds, and Government needs for chlorine disturbed the industry as today."

In supplementing Mr. Carruth's comments it may be pointed out that the Holyoke meeting referred to was held jointly with the Technical Section of the Canadian Pulp and Paper Association. In the spring of 1917 a meeting was held at Neenah, Wis., at which time the membership was 306. A feature paper was presented by S. Frank Shattuck of the Kimberly-Clark Corporation on "Safety and Social Service in the Industry." At the annual meeting held in February, 1918, the report of the Association War Service Committee by Frederic C. Clark showed the very valuable service of the association to the industry.

Raymond S. Hatch

Raymond S. Hatch of the Hamersley Manufacturing Company was elected to the presidency in 1919 together with Robert B. Wolf, consulting engineer, New York, N. Y., who was elected vice president.

Mr. Hatch has written as follows in regard to his administration:

"The membership in TAPPI was growing very rapidly following the end of the war in 1918 and I remember that during my administration, serious consideration was given to the idea of publishing our own journal. Tommy Keenan was then secretary of the Association and had been editor of the magazine *Paper* for several years. The activities of the association had reached a point where Tommy could not devote sufficient time to association affairs and at the same time act as editor of *Paper* as well as take care of other editorial duties imposed upon him by the publisher of *Paper*. The decision was

H. E. Fletcher Pres. 1915-1917 | W. G. MacNaughton Pres. 1917 | H. P. Carruth Pres. 1917-1919 | R. S. Hatch Pres. 1919-1921 | G. E. Williamson Pres. 1921-1923 | H. S. Taylor Pres. 1923-1925

reached, therefore, during my administration to employ him as full time secretary of TAPPI.

"Up until 1920, the dues of TAPPI for active members had been $10.00. With the rapid growth of the association and with the desire of its officers and executive committee to give more service to its members, the dues were raised in 1920 to $25.00 for active membership. The purpose of this increase was to give more service to members.

"*Technical Association Papers* was then in its third year and was a very modest publication. With the employment of a full time secretary and with increasing funds available, it was planned to extend the service of the association and make it more valuable to its members. Without doubt, this step, taken in 1920, was fully justified for the association has been rendering increased valuable service to its membership since that time.

"It was during the period from 1918 to 1920 that the committee on Vocational Education decided to publish the text books which today have become standard reference works of American pulp and paper manufacture. There is some contrast to glance over a Year Book such as that of 1940 and compare the list of members with the list of members which was published in *Technical Association Papers* in 1920. At that time, our membership was comparatively small and the necessity for a Year Book did not seem apparent.

"It was in the second year of my administration that the grade of Corporate Membership was established by the association and the first corporate members were admitted to membership."

During Mr. Hatch's two terms, regional meetings were held in Buffalo, N. Y. and Saratoga Springs, N. Y., the annual meetings being held in New York City. During this period Witham's "Modern Pulp and Paper Making" and Sutermeister's "Chemistry of Pulp and Paper Making" appeared. The Association membership reached 577.

George E. Williamson

George E. Williamson of the Strathmore Paper Company was elected president in 1921 and reelected in 1922. Frederic C. Clark of the American Writing Paper Company was elected vice president.

Mr. Williamson comments on his terms as follows:

"The events of 1921-22 that stand out in my memory include the loss through resignation of Thomas J. Keenan who had been secretary-treasurer of the association from the start. He was succeeded by William G. MacNaughton.

"A Service to Members Committee was organized and through it two other committees that did excellent work. These were the Waste in Industry Committee, of which R. B. Wolf and George D. Bearce were chairmen and the Paper Drying Committee, headed by S. B. Jones of the Pejepscot Paper Company.

"We entered into a cooperative agreement with the PAPER TRADE JOURNAL, wherein the latter established a TAPPI Section to include the Association's publications, under the editorship of the secretary. All members were placed on the subscription list with the subscription paid for by the association. I well remember the pleasant and fruitful conferences held at that time with Henry J. Berger, the editor."

Up to this time the association office had been the same as that of the publication *Paper* (117 E. 24th Street and later at 542 Fifth Ave.). In 1922 it was moved to 18 East 41st street, New York, N. Y., with the American Paper and Pulp Association. The annual dues were reduced from $25 to $15. During this period the text books on the Manufacture of Pulp and Paper were published, a sum of $44,246 being raised by TAPPI and the Canadian Pulp and Paper Association for this purpose. The first Special Reports on Manufacturing Problems were issued during Mr. Williamson's terms.

Thomas J. Keenan

Since Mr. Keenan's secretaryship ended during Mr. Williamson's administration it is well to pause here to note the fact. Mr. Keenan had been the editor of *Paper* and was elected secretary-treasurer when the association was organized. Through the medium of his publication he was able to keep the industry well informed concerning the association's activities. The association grew rapidly and during Mr. Hatch's administration he found it necessary to give full time attention to the association. He later became associated with the Exposition of Chemical Industries and *The Paper Industry*. He died in 1933 in Montclair, N. J.

Howard S. Taylor

Howard S. Taylor of the Management, Engineering and Development Company was elected president in 1923 and reelected in 1924. With him Grellet N. Collins was elected vice president.

Mr. Taylor comments as follows:

"New York with its meetings at the Waldorf in 1923-24, its banquets at the Commodore, and the wholehearted support of W. G. MacNaughton, then secretary, and R. S. Kellogg, of Newsprint Bureau fame, come to mind, along with committees, reports, and the eternal argument twixt those who sold and those who bought.

"TAPPI had gone over by 1923, well over, but there was much yet to be done with the relations of the technical man and the industry, to clearly prove his value in pulp and paper making, and the industry's need of him, from the source of raw materials to the finished roll or sheet.

"The years 1923-24 carried on this endeavor and the association made excellent gains in the interest of the mills throughout the industry, and thereby gained in membership, both individual and corporate, in security of mind and treasury, and in the certainty of expansion of service to the industry in the days ahead, all of which has come to pass in high ratio under following administrations, and with the able guidance of R. G. Macdonald, present Secretary.

"Would space permit, the names of many other associates, who were my friends and supporters through the two-year period, could be mentioned, for they were many and legion. One here and there has gone on to where the sheet breaks no more, and to

those who may read these lines I say, Regards to you."

During Mr. Taylor's terms the association published its first edition of Paper Testing Methods. A great amount of attention was given to ways of eliminating waste in the industry. A paper covered volume on Standard Methods for Testing Materials was issued. The membership was 584. A considerable amount of attention was given to mill apprenticeship programs.

George K. Spence

George K. Spence of the New York and Pennsylvania Company was elected in 1925 and served two terms. E. C. Tucker of the Chemical Paper Manufacturing Company was associated with him as vice president.

Mr. Spence comments as follows:

"Corporate membership of the association had decreased from 33 to 30 and the increase in other classes of members was practically at a standstill. Knowing the financial need of TAPPI we contacted all potential possibilities for corporate membership and procured 22 companies, increasing the number to 52. There was also an exceptionally large increase in other classes of membership.

"We changed the length of fall meetings from two, to three days, allowing for discussion of papers and business sessions in the mornings and outside activities including mill visitations in the afternoons. This increased the interest in fall meetings, which had been very much on the decrease prior to this change.

"We arranged for publication and distribution of proceedings of the fall meetings, which included discussion of papers presented and we had published in bound form and sold to members the replies to the first 37 Special Reports, under the Service to Members Plan.

"A committee to study stream pollution problems was appointed and we arranged for cooperation with similar committees operating in the various States. These activities resulted in the final arrangement with the American Paper and Pulp Association for the appointment of a National Stream Purification Committee, which held its first meeting in Chicago. This committee was active for a while, but was later replaced by the present Stream Pollution Committee of the A.P.P.A., which has for some time been very active in combating drastic national stream pollution legislation.

"We formed new committees on Industrial Training for the Industry and Vocational Training in the Industry."

E. C. Tucker

E. C. Tucker of the Chemical Paper Manufacturing Company was elected president in 1927 and served two terms. With him P. H. Glatfelter of the P. H. Glatfelter Company was elected vice president.

During Mr. Tucker's administration W. G. MacNaughton resigned as secretary-treasurer to become engineer for the News Print Service Bureau. He was replaced by R. G. Macdonald.

Three cloth-bound books were published: Paper Testing Methods; A Bibliography of Papermaking Materials; and Chemistry of the Sulphite Process.

The Technical Association medal was first presented in 1928 at Wausau, Wis., to Ogden Minton of the Minton Vacuum Drier Corporation and to William Mason of the Masonite Corporation.

W. G. MacNaughton

William G. MacNaughton, one of the founders of the association, was secretary-treasurer from 1921 to 1927. Due to an automobile accident he was unable to take up his duties when elected and Thomas J. Burke, Secretary of the Cost Association of the Paper Industry, was acting secretary for a few months. Mr. MacNaughton had been elected president, succeeding Harry Fletcher but found it necessary to resign when he went to the Inland Empire Paper Company as manager. Mr. MacNaughton extended the activities of the association to a considerable extent and turned over an excellent organization to his successor R. G. Macdonald in December, 1927.

P. H. Glatfelter

P. H. Glatfelter was elected president in 1929 and served one term. With him was M. A. Krimmel of the Hammermill Paper Company as vice president.

Mr. Glatfelter comments as follows:

"TAPPI, in the memorable year of 1929, can best be described, I believe, as suffering from growing pains. Above all it needed better organization, a larger membership, and more money to help a promising youth develop the full stature of a great association. One remedy for relieving the pains was found in establishing contributing memberships, now known as sustaining memberships. We were also fortunate in electing 194 new individual members and increasing the number residing in Europe.

G. K. Spence
Pres. 1925-1927

E. C. Tucker
Pres. 1927-1929

P. H. Glatfelter
Pres. 1929-1930

M. A. Krimmel
Pres. 1930-1932

Allen Abrams
Pres. 1932-1934

C. C. Heritage
Pres. 1934-1936

"Toward better organization our Pacific Section, and first of our present sections, was formed. For the first time a meeting was held below the Mason-Dixon Line, the fall meeting at Richmond, Va. This was the best attended meeting up to that time, which gave us reason to believe there was some virtue in the innovation.

"On the technical side an energetic program was carried out, including the publishing of West's Bibliography of Papermaking 1900-1928. This is one of our best remembered contributions for it was the first time any such work had been done for the industry.

"We are also proud of another "first" when a $1000 fellowship was established at the Forest Products Laboratory, for the study of the relation of sheet properties to fiber properties through sheet structure.

"In subsequent years it has been a pleasure to see the growing pains being completely outgrown. TAPPI's contributions to the industry and to the use of paper everywhere are of indispensable and inestimable value, and I am sure the industry as a whole is proud of the men who have contributed so much of their time and energy in the growth of our association. I sincerely hope that the same spirit of cooperation continues. The years ahead of us are uncertain, but there will be many opportunities for the technical minds of our membership to develop ways and means for new and improved qualities and products."

During Mr. Glatfelter's administration the membership passed the one thousand mark.

M. A. Krimmel

Max A. Krimmel of the Hammermill Paper Company was elected president in 1930 and served two terms. During this period Allen Abrams of the Marathon Paper Mills was vice president.

A continuous series of Special Reports were issued from year to year, reaching 150 in 1931.

Mr. Krimmel devoted considerable time to the reorganization of the Association on a divisional basis. Under this arrangement the committees were grouped according to their general fields of interest. This type of organization still exists.

Although space does not permit, it is important to remember that the activities of the association, particularly those of its growing number of committees, were expanding greatly and required a larger executive committee to assist in handling the numerous administrative details.

Membership increased to 1196 in 1931.

Three local sections were organized: the Lake States Section at Menasha, Wis.; the Kalamazoo Valley Section at Kalamazoo, Mich.; and the Delaware Valley Section at Philadelphia, Pa.

The association participated with a number of other organizations in the formation of the Inter-Society Color Council, an organization to study the technical problems related to color.

A research fellowship at the Forest Products Laboratory was financed.

Allen Abrams

Allen Abrams of the Marathon Paper Mills was elected president in 1932 and served two terms and C. C. Heritage of the Oxford Paper Company was elected vice president.

Mr. Abrams comments as follows:

"With respect to the accomplishments during my administration as president of TAPPI, I would report as follows: At the time I took office an entirely new and comprehensive committee setup had been worked out by the previous administration under Max Krimmel. It, therefore, became necessary to define the duties of officers and committees; to establish standard methods, practices and specifications; finally, to set the whole organization into operation. The present day system is based on work carried on during that period.

"During this administration the TAPPI Year Book and the TAPPI Standards were first issued. The TAPPI Council, an informal group, was put into operation in order to allow interested people an opportunity of discussing and helping to formulate the policies of the organization.

"There was a carefully planned procedure of improving the programs at our TAPPI meetings by securing papers of high quality and helping authors in the presentation of their papers.

"The finances of the Association came in for extended study, as the result of which certain procedures were installed, most of which are still in operation.

"As this administration was during the days of the NRA, considerable work was done in assisting the formulation of codes and of testing procedures to help make these codes effective."

In December 1933 the offices of the association were moved to 370 Lexington avenue, New York, N. Y., from 18 East 41st street. The A.P.P.A. also moved to the same address.

The number of Special Reports issued reached 205.

The New England Section was organized in 1933 at Holyoke, Mass.

In May 1933 a cruise on the Savannah Line was enjoyed by about one hundred. This was for the purpose of inspecting the new laboratory of Charles H. Herty at Savannah.

Clark C. Heritage

Clark C. Heritage of the Oxford Paper Company was elected president in 1934 and served two terms. Grellet N. Collins of the International Paper Company served with him as vice president. During this period the Association headquarters were moved, with those of the A.P.P.A., to 122 East 42nd street, New York, N. Y.

Mr. Heritage comments as follows:

"The years of 1934 to 1936 were those during which the industry was taking important steps toward improving business conditions after the bottom of the depression. Certain of these measures resulted in giving great impetus to technical matters, which in turn stimulated many of the activities of the asso-

ciation. The major theme governing association planning was expanded and improved service to the members and the industry. The committee organization was further perfected and strengthened, especially through more careful planning. A planning board of the Vice President and the seven divisional chairmen was set up, development reports were published annually by the committee chairmen, project authorizations were initiated for committee work, and research grants were made available to the committee organization for cooperation with research and educational institutions to develop needed technical information, administered by a special committee on 'Educational Cooperation.'

"The Manual of Standards issued in loose leaf form in 1933, was enlarged and widely distributed. The annual *Technical Association Papers* grew to a substantial cloth-bound volume. Revision of the text books on The Manufacture of Pulp and Paper was undertaken.

"In 1934 the national fall meeting of the Association was held for the first time on the Pacific Coast, the Association being the guests of the Pacific Section. A special train carried Eastern members from Chicago to Portland, Ore. This meeting will always be remembered as one of the outstanding gatherings of the Association.

"The Ohio Section was chartered at Middletown, Ohio, in October, 1935, and a Northern New York group was organized which later became the Empire State Section."

Grellet N. Collins

Grellet N. Collins of the International Paper Company was elected president in 1936 and served two terms. Associated with him as vice president was William R. Maull of the Mead Corporation.

During Mr. Collins administration the membership reached 1521 individual members; 87 corporate members and 91 contributing members. Special Reports Nos. 250 to 280 were issued in this period.

Two interesting summer or fall meetings were held, the first jointly with the Technical Section of the Canadian Pulp and Paper Association on a Saquenay cruise ship and the second at Savannah, Ga., the first meeting in the deep South, which was the best attended meeting to-date aside from the annual meetings.

A collective Bibliography of Paper Making covering the years 1928-1935 was published.

A fiber identification symposium and a microchemistry seminar were held at the Institute of Paper Chemistry in Appleton, Wis.

Beginning in 1938 the Bibliographies of Paper Making were published as separate cloth-bound volumes.

Frederic C. Clark

Frederic C. Clark, consulting engineer, was elected president in 1938 and served two terms. During his first term Harold R. Murdock of the Champion Paper and Fibre Company was vice president and in his second term W. H. Swanson of the Kimberly-Clark Corporation was vice president.

During his administration the membership climbed to 1645 individual members.

The fall meetings were held at Green Bay, Wis. and Syracuse, N. Y.

A seminar on optical properties was held at the Institute of Paper Chemistry.

The Empire State Section received its charter in 1938.

In 1939 the TAPPI Data Sheets, in a loose-leaf binder, was issued. These are of particular value to engineers, chemists and operating department heads.

A working fund of $3000 was appropriated to help the Institute of Paper Chemistry finance its Color Atlas of Fiber Identification and $5000 were contributed to the American Paper and Pulp Association to finance the publication of the book on Definitions of Paper.

In his Presidential address Mr. Clark stated:

"While TAPPI, by its growth, has lost in some respects it has in others made great gains. Today, our large meetings are like forums where new ideas are presented and discussed and where symposiums are held to discuss the various phases of a subject. These meetings have become much like post graduate seminars with informative material presented in lecture form, followed by a brief discussion period. The earlier meetings with their eight or ten papers have been replaced by four day conventions with their hundred or more papers, making it necessary to run several sessions simultaneously. In the early days everyone knew considerable about each paper presented whereas today we must consider a multiplicity of subjects, covering every branch of science and manufacturing."

Walter H. Swanson

W. H. Swanson of the Kimberly-Clark Corporation was elected president in 1940 and is serving in his second term with Ralph A. Hayward of the Kalamazoo Vegetable Parchment Company as vice president.

Mr. Swanson's administrations have been marked by a more intensive development of the existing structure and activities of the association.

In 1940 a fiber identification seminar was held at the Institute of Paper Chemistry.

For the second time a national fall meeting was held on the Pacific Coast, this time at Seattle, Wash.

The number of Special Reports issued has reached 318. The membership reached 1794.

It is interesting to note that the first volume of *Technical Association Papers* published in 1918 contained 64 pages, the 1940 and 1941 volumes contain 752 pages, reflecting the growth in volume of meeting subjects mentioned by Mr. Clark.

Two interesting publications are in process of being edited, printed and distributed. These are the

G. N. Collins
Pres. 1936-1938

F. C. Clark
Pres. 1938-1940

translation of Loeschbrandt's "Bleaching of Sulphate Pulp" and the Association's first monograph on "Water for Industrial Purposes" prepared by the TAPPI Water Committee.

T. J. KEENAN
Sec.-Treas. 1915-1922

Mr. Swanson, as a contribution to this anniversary resume, has outlined his viewpoint on the outlook for the future of the Technical Association as follows:

"Where should we go from here? That question is continually before the Technical Association and particularly its Executive Committee, which, after all, is a limited elected group from the active membership and, we hope, a true or typical cross section of this membership.

"Like any other association or any other enterprise, for that matter, the Technical Association at any particular time has a policy or program which it follows in the administration of its affairs. However, this program is not permanent in all details for all time. Certain features become fixtures which fit the nature of the Association's work and are only modified by being strengthened through changing specific functional parts which prove to be weak, unwieldy, or obsolete. Conversely other phases of the program become of less value and gradually disappear, new ones being substituted which are consistent with the changing times.

"In order to obtain an indication as to the probable future trend of the association's work program, an examination of its nature and the evolving changes over the past years is helpful. To predict exactly what the future program will be is impossible and to recommend exactly what it should be would be facetious. But to indicate which trends appear to warrant more concerted effort in developing is perhaps not amiss.

"Let us consider first the basic objectives which were sought by the founders of the association. Primarily, it was desired to develop a medium or environment which would permit technical men of the pulp and paper industry to contribute to its basic fundamental or scientific knowledge underlying the various phases of the industry's manufacturing practices. Secondly, it was deemed very essential to set up machinery for converting this sometimes abstract knowledge into working tools such as testing procedures, manufacturing standards, product standards, and correct performance procedures for the several processes.

"Obviously, with objectives of the nature of the above the association must of necessity be considered an educational society, democratic in nature, and not a learned society made up of intellectual giants trying to insulate themselves from the other functional groups in the industry.

"That the association has maintained this educational viewpoint over the years since its inception is demonstrated by the character of its membership roll. We have the junior membership requiring limited training and experience in the industry on the part of the applicant; then there is the associate membership requiring a moderate amount of training and experience; and finally the active membership requiring extensive training and experience as qualifications. And in addition, the recent institution of affiliate membership has made available to those persons with no experience in an association with the industry, either directly or indirectly, the information which the association disseminates to its membership.

"Basically this policy of education through distribution of technical information relating to the pulp and paper manufacturing processes and products, being the reason for existence of the Association needs no change. All that is required is that the Executive Committee bear in mind that the society is not limited in membership. It should be open to all that have a technical interest in the industry. However, careful exercise of the classification of memberships should always be in the minds of the committee. It must be realized that the machinery of the Association is operated by the *active* members solely and that this portion of the membership should be made up only of those who are fully qualified both by training and experience. If this is done, results will remain at their present high plane of quality.

"The association's program originally centered around its meetings. It still does, but is supplemented by many added activities. We have now the committee structure which provides recognized channels for development of specific information for each phase of of the industry's operations. There is the program of fostering of local sections as a means for providing more frequent contacts between technical men within limited geographical areas. The research promotion program which entails financial support by the Association of certain research projects is in force. The publication program including such items as the *Technical Association Papers*, the Bibliography of Paper Making, the TAPPI Standards, the TAPPI Data Sheets, and the recently instituted project for fostering monographs by members on specific subjects is another important activity.

"Let us consider the above as the important functional features of the Association and see what the future holds in connection with them.

"First, with respect to the meetings, it can be assumed that there will be no major change in the character of the annual meeting. The only crying need here is a better physical environment and this will be provided next year. The fall meetings will probably follow the trend set by that held on the Pacific Coast last year and become more intensely educational in nature. The one being held at Ann Arbor this year demonstrates the trend markedly.

"The committee program will change only in that individual committees will probably tend toward a make-up involving a central group closely associated geographically to permit of more frequent personal contacts. This should work toward more effective committee output.

"The local sections program is receiving considerable attention by the Executive Committee at the present time. This can and should be one of the main

activities fostered by the Association. Suffice it to say that some quite specific plans which are being developed will be laid before the Association in the near future.

"As concerns research promotion, the present program probably can be made more effective and beneficial to the individual members. It should receive major attention and definite action on the part of the Executive Committee.

"The monograph phase of the publication's program is an attractive field to explore and develop. There is developing within the membership of the Association a group of technicians who may be considered competent authorities in every phase of the industry's structure. It certainly would be to the advantage of the industry to have these men make their knowledge available in the form of monographs, financed by the Association. This program now started should be actively supported.

"Considered over all, then, there does not appear to be a necessity for any startling changes in the nature of the association's policy program. The evolutionary changes indicated will develop as a matter of course and are sound in principle."

R. G. Macdonald

R. G. Macdonald became secretary-treasurer of the association in December 1927, succeeding William G. MacNaughton who resigned to become engineer for the News Print Service Bureau. Prior to his election Mr. Macdonald was a chemical engineering student at the Massachusetts Institute of Technology, an operating apprentice with the Pejepscot Paper Company, a research chemist with the Oxford Paper Company, and a member of the staff of *Chemical and Metallurgical Engineering*, a McGraw-Hill publication.

Carrying out the policy formulated by the executive committee, Mr. Macdonald has been active in promoting committee activities, organizing and assisting local sections, handling publications and assisting the executive committee in administrating the extensive affairs of the association. Since 1938 he has been assisted by Vincent F. Waters as technical assistant.

The TAPPI Attitude

In passing it is interesting to refer back to an item which appeared in the *Journal of Commerce*, a leading New York financial newspaper, in October 1917. It probably could be written in the same vein today.

"Altruism and cooperative fellowship evidently permeate the paper industry, as they do in some other business organizations. Here are men of international reputations as experts, occupying responsible positions with the largest concerns, freely giving their competitors and the industry in general the benefit of their experimentation and learning, not for selfish gain, but for the common uplift of the entire industry. And in some cases it has a distinctly patriotic tendency."

Present Members of TAPPI Who Joined the Association in 1915

The following is a list of the members of the Technical Association of the Pulp and Paper Industry who were members of the Technical Section of the A.P.P.A. in 1915. Their connection in 1915 is listed first and this is followed by their present connection. There are 54 members today who joined in 1915.

Baker, W. E. B., chief chemist, York Haven Paper Company, York Haven, Pa. (Manager of Paper Research, Castanea Paper Company, Lock Haven, Pa.)

Bray, Paul DeC., Associate Professor of Chemistry, University of Maine (Professor and Head, Department of Pulp and Paper Technique, University of Maine, Orono, Maine).

Carruth, H. P., chief chemist, American Writing Paper Company, Holyoke, Mass. (President, Brown Company, Berlin, N. H.)

Chalon, O. T., paper expert, Badische Company, New York, N. Y. (Paper expert, General Dyestuff Corporation, New York, N. Y.)

Clark, Frederic C., In Charge of Paper Laboratory, Bureau of Standards, Washington, D. C. (Consulting engineer, Newton, Mass.)

Cline, Max, Chemist, Bureau of Tests, International Paper Company, Glens Falls, N. Y. (Same).

Curtis, Fred A., Chemist Aetna Paper Company, Dayton, Ohio. (Technical Paper Sales, American Writing Paper Corporation, Holyoke, Mass.)

Davis, J. F., superintendent, Beckett Paper Company, Hamilton, Ohio. (Cambridge, Mass.)

Eliason, H. D., manager, George F. Sherlin Company, Saratoga Springs, N. Y. (Sales engineer, Johanneson, Wales and Sparre, Kalamazoo, Mich.)

Everest, D. C., Secretary and General Manager, Marathon Paper Mills, Rothschild, Wis. (Vice president and general manager, same).

Farrell, F. W., chemist, Ideal Coated Paper Company, Brookfield, Mass. (Secretary and technical director, McLaurin-Jones Company, Brookfield, Mass.)

Fishburn, V. E., mill manager, Groveton Paper Company, Groveton, N. H. (Vice president, Burgess Cellulose Company, Freeport, Ill.)

Fletcher, H. E., Fletcher Paper Company, Alpena, Mich. (Vice president and general manager, same).

Green, Arthur B., Engineer, S. D. Warren Company, Cumberland Mills, Maine. (Consulting engineer, Needham, Mass.)

Griffin, R. C., director of tests and treasurer, Arthur D. Little, Inc., Cambridge, Mass. (Same).

Guettler, H. W., Manager, American Barking Drum Company, Chicago, Ill. (President, Fibre Making Process Company, Chicago, Ill.)

Hatch, Ray S., general superintendent, Crocker-McElwain Company, Holyoke, Mass. (Director of research, Weyerhaeuser Timber Company, Longview, Wash.)

Haug, A. J., engineer, Improved Paper Machinery Company, Nashua, N. H. (Manufacturer of pulp mill machinery, Nashua, N. H.)

Haynes, E. A., Vice President, Port Huron Sulphite Company, Port Huron, Mich. (Same).

Hedden, M. W., night superintendent, Sulphite Mill, E. B. Eddy Company, Hull, P. Q. (Chemical engineer, Racquett River Paper Company, Potsdam, N. Y.)

Heritage, Clark C., Assistant to president, Paper Board Corporation of Tonawanda, Tonawanda, N. Y. (Research and development engineer, Wood Conversion Company, Cloquet, Minn.)

Jenssen, J. D., engineer, G. D. Jenssen Company, New York, N. Y. (Partner, same).

Klund, F. P., Assistant secretary and mechanical engineer, Hammermill Paper Company, Erie, Pa. (Assistant secretary, same).

Kress, Otto, In charge, Pulp and Paper Section, U. S. Forest Products Laboratory, Madison, Wis. (Technical director, Institute of Paper Chemistry, Appleton, Wis.)

Lawrence, W. J., manager, Western Paper Makers Chemical Corporation, Kalamazoo, Mich. (President, Bryant Paper Company, Kalamazoo, Mich.)

MacNaughton, W. G., In Charge of Manufacturing, Nekoosa-Edwards Paper Company, Port Edwards, Wis. (Engineer, News Print Service Bureau, New York, N. Y.)

Mahler, Ernst, chemist, Kimberly-Clark Corporation, Neenah, Wis. (Vice President, same).

McKee, Ralph H., Head of Pulp and Paper School, University of Maine, Orono, Maine. (Professor (retired) Columbia University, New York, N. Y.)

Mead, G. H., president, Mead Pulp and Paper Company, Dayton, Ohio. (President, Mead Corporation, Dayton, Ohio).

Murphy, T. R. H., chief engineer, Port Arthur Pulp and Paper Company, Port Arthur, Ont. (Consulting engineer, G. H. Mead Company, New York, N. Y.)

Murray, James, chemist, Nashua Gummed and Coated Paper Company, Nashua, N. H. (Martin Cantine Company, Saugerties, N. Y.)

Nunez, V. E., Research chemist, Arthur D. Little, Inc., Cambridge, Mass. (Vice president, Nashua Gummed and Coated Paper Company, Nashua, N. H.)

Oberdorfer, Max, engineer and chemist, Central Paper Company, Muskegon, Mich. (President, St. Helens Pulp and Paper Company, St. Helens, Ore.)

Obermanns, Henry F., assistant to the President, Hammermill Paper Company, Erie, Pa. (Vice president in charge of manufacturing, same).

Parant, L. J., general superintendent, St. Croix Paper Company, Woodland, Maine. (Vice president in charge of manufacture, same).

Patch, Clifford, chemist, Orono Pulp and Paper Company, Orono, Maine. (Chief chemist, Eastern Corporation, South Brewer, Maine.)

Paulson, P. A., sulphite superintendent, Kimberly-Clark Corporation, Neenah, Wis. (Consulting Engineer, Appleton, Wis.)

Robertson, Reuben B., general manager, Champion Fibre Company, Canton, N. C. (Executive vice president and general manager, Champion Paper and Fibre Company, Canton, N. C.)

Rothchild, Henry A., chemist, Kimberly-Clark Corporation, Neenah, Wis. (Chemical engineer, same).

Rue, John D., assistant professor of Chemical Engineering, University of Michigan, Ann Arbor, Mich. (Engineer, Hooker Electrochemical Company, Niagara Falls, N. Y.)

Schneider, C. C., chemist, Hawthorn Paper Company, Kalamazoo, Mich. (Same).

Scott, D. E., Assistant chemist and experimental papermaking, Arthur D. Little, Inc., Cambridge, Mass. (General superintendent, Chase Bag Company, Chagrin Falls, Ohio).

Skinner, H. J., vice president, Arthur D. Little, Inc., Cambridge, Mass. (President, Skinner and Sherman, Boston, Mass.)

Spierling, A. O., superintendent of power, Hammermill Paper Company, Erie, Pa. (Assistant general superintendent, same).

Stephenson, J. Newell, Assistant professor of Pulp and Paper Technology, University of Maine, Orono, Maine. (Editor, *Pulp and Paper Magazine of Canada*, Gardenvale, P. Q.)

Sutermeister, Edwin, chief chemist, S. D. Warren Company, Cumberland Mills, Maine. (Same).

Thorne, C. B., manager, Riordan Pulp and Paper Company, Ltd., Hawkesbury, Ont. (Vice president, Canadian International Paper Company, Hawkesbury, Ont.)

Traquair, John, vice president, Feculose Company of America, Ayer, Mass. (Director of the research department, Mead Corporation, Chillicothe, Ohio).

Wardle, E. B., chief engineer, Laurentide Company, Ltd., Grand Mere, P. Q. (Consulting engineer, Consolidated Paper Corporation Ltd., Grand Mere, P. Q.)

Wells, Sidney D., engineer, Forest Products Laboratory, Madison, Wis. (Research associate, Institute of Paper Chemistry, Appleton, Wis.)

Williamson, George E., chief engineer, Strathmore Paper Company, Mittineague, Mass. (Treasurer, same, W. Springfield, Mass.)

Wolf, Robert B., manager of manufacturing, Burgess Sulphite Fibre Company, Berlin, N. H. (Manager, Pulp Division, Weyerhaeuser Timber Company, Longview, Wash.)

Yoerg, Leon M., superintendent, Carew Manufacturing Company, S. Hadley, Mass. (President, American Writing Paper Company, Holyoke, Mass.)

Constitution and Code of Ethics

The growth and organization problems of the association have been reflected in the changes that have been made in its Articles of Organization. The present document consisting of a constitution and bylaws was adopted in 1940. The constitution may be amended by the association members and the bylaws by the Executive Committee.

Objects of the Association

The objects of the association are cited as follows:

a. To further the application of the sciences in the pulp and paper industry.

b. To promote investigation, research and interchange of ideas among its members in the field of pulp and paper manufacture and use.

c. To promote education in the science and practice of pulp and paper manufacture.

d. To arrange for the collection and dissemination of information relating to the pulp and paper industry and for the presentation, discussion and publication of papers and other contributions.

e. To provide technical facts, data and standards, fundamental to pulp and paper manufacture and use.

f. To promote the professional, social and economic welfare of its members.

There are four classes of individual members and two of company members. Of the former there are active, associate, affiliate and junior members and of the latter, corporate and sustaining. The individual members are expected to have a technical training and to be engaged in the manufacture of pulp and paper or in work of a technical character in industries, institutions or services related thereto. The corporate members are paper and pulp companies and the sustaining members are companies in the allied industries. Only active members may hold office and both active members and the official representatives of corporate members may vote.

Officers are elected by a mail ballot prepared by a nominating committee appointed by the Executive Committee. A group of at least twenty-five members may propose candidates whose names may appear on the ballot.

Provision is made for the establishment and administration of local sections, dues, standards, committees, amendments, etc.

Code of Ethics*

In 1933 the association adopted a code of ethics to guide the professional conduct of its members. This provides for the following:

This association expects that each member shall be guided in his conduct by the following:

1. He shall guard and uphold the high standard of honor for which the association stands, by fidelity to the interests of his employers or clients and by a fine spirit of courtesy and friendliness in his intercourse with all members of the association.

2. In all his relations he shall be guided by the highest principles of honor and thus maintain the dignity and high reputation of the association.

3. He shall not use any unfair, improper, or questionable methods in securing employment.

4. He shall, when he is an executive and an employer of members of the association, act fairly and with consideration in his relation with member employes.

5. He shall carefully avoid any interference with business of a fellow member by overtures to any member's employes for professional services for the divulging of technical methods or processes known to such an employe.

6. He shall cooperate in improving the application of technical information as connected with the pulp and paper industry, and will also, as far as seems wise, exchange general information and experience with fellow members, and will further make more valuable the association by contributing technical papers where such information does not conflict with the interest or interests of his employer or client.

7. He shall be frank in the expression of opinion regarding work requested of him by clients or employers where such work seems to present improbabilities of successful results and shall advise before undertaking the work.

8. He shall be diligent in exposing and opposing such errors and frauds as his experience and knowledge enables him to recognize.

9. He shall not use undignified, sensational or misleading language or advertising that is likely to discredit him or his membership in this association.

10. He shall interest himself in the public welfare in behalf of which he will be ready to apply his special knowledge, skill and training for the use and benefit of mankind.

11. In all cases not covered by the above it is suggested that a close observance of the Golden Rule may be regarded as a proper guide of conduct.

* Adopted February 13, 1933.

The Meeting Places of the Association

Since 1915 the annual meeting of the Association has always been held in New York City, first at the old Waldorf-Astoria on Fifth avenue and 34th street. When this building was torn down to make way for the Empire State Building the association met at the Pennsylvania Hotel on Seventh avenue and 33rd street from 1930 to 1933 inclusive. It then met at the new Waldorf-Astoria on Park avenue from 1934 to 1938 inclusive.

To Meet Next Year at Hotel Commodore

During these years it met at the same time and in the same place as the American Paper and Pulp Association and its affiliated organizations. Because of the National Recovery Act program and the growth in interest in the meetings of the Technical Association it was necessary to find larger quarters. In 1939, therefore, the association held its annual meeting at the Roosevelt Hotel on Madison and Vanderbilt avenues. Although it had the exclusive use of the facilities of this excellent hotel the phenomenal growth in attendance at this meeting forced another change and in February, 1942, the meeting will be held at the Commodore Hotel where ample space conveniences will be available for a few years.

An Advantageous Arrangement

Holding the annual meetings in New York during Paper Week has been advantageous since many members are expected to attend meetings of the various trade associations and take advantage of this opportunity to meet customers, representatives and the many others of kindred interests who are in New York at the time.

Fall Meetings Held In Paper Centers

The fall meetings are generally held in centers having some paper manufacturing interest. The dates are dependent on expected weather and other conditions. Meetings at Seattle and Montreal have been held as early as August and the meeting at Savannah, Ga. was held as late as mid-October.

Location of Fall Meetings

Following is a list of the locations of the various fall meetings:

1915 New York, N. Y.
1916 Kalamazoo, Mich. (May)
1917 New York, N. Y. (September)
1917 Neenah, Wis. (May)
1917 Holyoke, Mass. (September)
1918 Dayton, Ohio
1919 Buffalo, N. Y. and Erie, Pa.
1920 Saratoga Springs, N. Y.
1921 No meeting
1922 Detroit, Mich.
1923 Appleton, Wis.
1924 Buffalo, N. Y.
1925 Kalamazoo, Mich.
1926 York, Pa.
1927 Middletown, Ohio
1928 Wausau, Wisconsin
1929 Richmond, Va.
1930 Erie, Pa.
1931 Kalamazoo, Mich.
1932 Holyoke, Mass.
1933 Appleton, Wis.
1934 Portland, Ore.
1935 Atlantic City, N. J.
1936 Montreal, P. Q.
1937 Savannah, Ga.
1938 Green Bay, Wis.
1939 Syracuse, N. Y.
1940 Seattle, Wash.
1941 Ann Arbor, Mich.

Meetings in South and on Coast

It is to be noted that two meetings have been held in the South at Richmond and Savannah, two on the Pacific Coast at Portland and Seattle and one in Canada at Montreal, followed by a cruise down the St. Lawrence and up the Saguenay Rivers. During most of the fall meetings provision has been made to visit paper mills and other industrial plants. The Canadian meeting was held jointly with the Technical Section of the Canadian Pulp and Paper Association.

Arrangements for the Meetings

The program for the annual meetings has been arranged each year by the committee and divisional chairmen and the secretary. The fall meetings, on the other hand, have been arranged largely by strong local committees with the assistance of the secretary and national committee chairmen. The success of the fall meetings has been largely due to the skill with which the local committees have dramatized their regional resources. In addition to fine technical programs there have been mill visits, athletic activities and elaborate social functions. It has been enjoyable to note the enthusiasm and thoroughness with which the local groups have organized and conducted the fall meetings. It has done much to promote good will and understanding among the members and has resulted in added efficiency on their part in their services to their respective companies. Sending representatives to the meetings of the Technical Association has yielded high dividends to the pulp and paper industry.

The TAPPI Executive Committee

The success of the Technical Association, as with other professional societies, has reflected the initiative and ability of its leadership and the cooperation of the members. From the beginning the association has elected its officers and executive committeemen on the basis of their demonstrated service to the Association and to the industry. In 1915 the three officers and three members constituted the committee. Today there are fourteen members on the committee, generally representing the major paper grades, pulp and papermaking regions and the professions and arts represented in the membership.

Although the term of the officers has been but one year, in most cases they have been called to serve a second term. One third of the executive committee has been elected each year to succeed those who have served three years.

In practice, the executive committee has devoted its attention largely to policy forming matters and has passed on the qualifications of all candidates for membership. Since most of the subjects dealt with have been of major concern to the organization they have been assigned to subcommittees of the committee for thorough study and recommendations.

The committee meets when called by the president. These meetings are usually held on the day preceding the annual and fall meetings. Whenever the occasion requires, meetings may be called at other times. In the periods between such meetings a considerable amount of work is carried on by correspondence, thereby reducing the need of more frequent meetings.

Following is a list of members who have served on the executive committee of the past twenty-six years. The first two names in each case refer to the President and Vice President.

1915

H. E. Fletcher
W. G. MacNaughton
C. F. Rhodes
H. F. Obermanns
E. Mahler
T. J. Keenan

1916

H. E. Fletcher
W. G. MacNaughton
C. F. Rhodes
H. F. Obermanns
E. Mahler
T. J. Keenan

1917

W. G. MacNaughton
H. P. Carruth
H. F. Obermanns
E. Mahler
H. E. Fletcher
T. J. Keenan

1918

H. P. Carruth
H. F. Obermanns
H. E. Fletcher
R. S. Hatch
F. C. Clark
T. J. Keenan

1919

R. S. Hatch
R. B. Wolf
H. E. Fletcher
F. C. Clark
H. P. Carruth
O. L. E. Weber
G. E. Williamson
T. J. Keenan

1920

R. S. Hatch
R. B. Wolf
H. E. Fletcher
F. C. Clark
H. P. Carruth
G. E. Williamson
R. S. Kellogg
T. J. Keenan

1921

G. E. Williamson
F. C. Clark
R. S. Kellogg
G. N. Collins
G. H. Harvey
E. C. Tucker
G. K. Spence
W. G. MacNaughton

1922

G. E. Williamson
F. C. Clark
R. S. Kellogg
G. N. Collins
G. H. Harvey
E. C. Tucker
G. K. Spence
W. G. MacNaughton

1923

H. S. Taylor
G. N. Collins
R. S. Kellogg
G. H. Harvey
E. C. Tucker
G. K. Spence
B. T. McBain
W. G. MacNaughton

1924

H. S. Taylor
G. N. Collins
R. S. Kellogg
E. C. Tucker
B. T. McBain
W. E. B. Baker
L. J. Parant
W. G. MacNaughton

1925

G. K. Spence
E. C. Tucker
R. S. Kellogg
B. T. McBain
W. E. B. Baker
L. J. Parant
D. C. Everest
W. G. MacNaughton

1926

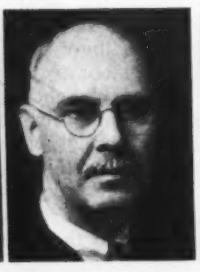
G. K. Spence
E. C. Tucker
R. S. Kellogg
B. T. McBain
W. E. B. Baker
L. J. Parant
D. C. Everest
H. O. Keay
R. H. Laftman
W. G. MacNaughton

1927

E. C. Tucker
P. H. Glatfelter

V. P. Edwards
Executive Committee

F. D. Libby
Executive Committee



R. C. Griffin
Executive Committee

H. H. Harrison
Executive Committee

Albert Bankus
Executive Committee

G. L. Bidwell, Jr.
Executive Committee

M. P. Chaplin, Executive Committee | J. L. Parsons, Executive Committee | Pierre Drewsen, Executive Committee | H. H. Hanson, Executive Committee | B. D. Millidge, Executive Committee | G. W. E. Nicholson, Executive Committee

Allen Abrams
R. S. Kellogg
H. O. Keay
R. H. Laftman
B. T. McBain
M. A. Krimmel
E. R. Low
W. G. MacNaughton

1928

E. C. Tucker
P. H. Glatfelter
Allen Abrams
H. O. Keay
R. H. Laftman
B. T. McBain
M. A. Krimmel
E. R. Low
W. G. MacNaughton
R. G. Macdonald

1929

P. H. Glatfelter
M. A. Krimmel
Allen Abrams
R. H. Laftman
W. G. MacNaughton
R. A. Hayward
W. O. Johnson
R. Bell-Irving
J. S. Bates
R. G. Macdonald

1930

M. A. Krimmel
R. H. Laftman
W. O. Johnson
J. H. Slater
Allen Abrams
J. S. Bates
C. C. Heritage
W. G. MacNaughton
R. Bell-Irving
R. G. Macdonald

1931

M. A. Krimmel
Allen Abrams
J. S. Bates
R. Bell-Irving
C. C. Heritage
W. O. Johnson
J. H. Slater
G. N. Collins
J. F. Rhoades
R. G. Macdonald

1932

Allen Abrams
C. C. Heritage
W. O. Johnson
J. H. Slater
M. A. Krimmel
G. N. Collins
J. F. Rhoades
G. S. Holmes
R. A. Hayward
W. S. Kidd
B. T. Larrabee
R. G. Macdonald

1933

Allen Abrams
C. C. Heritage
G. N. Collins
J. F. Rhoades
H. R. Murdock
R. A. Hayward
W. S. Kidd
B. T. Larrabee
Otto Kress
W. R. Maull
E. O. Reed
R. G. Macdonald

1934

C. C. Heritage
G. N. Collins
R. A. Hayward
W. S. Kidd
B. T. Larrabee
Otto Kress
W. R. Maull
E. O. Reed
H. P. Carruth
H. U. Kiely
H. R. Murdock
R. G. Macdonald

1935

C. C. Heritage
G. N. Collins
E. O. Reed
W. R. Maull
H. R. Murdock
Otto Kress
H. P. Carruth
H. U. Kiely
A. E. H. Fair
W. J. Lawrence
Albert Bankus
R. G. Macdonald

1936

G. N. Collins
W. R. Maull
H. U. Kiely
H. R. Murdock
G. W. E. Nicholson
Albert Bankus
A. E. H. Fair
W. J. Lawrence
R. C. Griffin
W. H. Swanson
M. H. Teaze
R. G. Macdonald

1937

G. N. Collins
W. R. Maull
Albert Bankus
A. E. H. Fair
W. J. Lawrence
R. C. Griffin
W. H. Swanson
M. H. Teaze
H. R. Murdock
W. M. Shoemaker
John Traquair
R. G. Macdonald

1938

F. C. Clark
H. R. Murdock
F. D. Libby
R. C. Griffin
W. H. Swanson
M. H. Teaze
Albert Bankus
G. D. Bearce
W. M. Shoemaker
John Traquair
L. C. Anderson
G. S. Brazeau
G. W. E. Nicholson
B. M. Thomas

1939

F. C. Clark
W. H. Swanson
Albert Bankus
G. D. Bearse
W. M. Shoemaker
John Traquair
L. C. Anderson
G. S. Brazeau
G. W. E. Nicholson
B. M. Thomas
F. D. Libby
R. C. Griffin
V. P. Edwardes
H. H. Harrison

1940

W. H. Swanson
R. A. Hayward
L. C. Anderson
G. S. Brazeau
G. W. E. Nicholson
B. M. Thomas
V. P. Edwardes
H. H. Harrison
R. C. Griffin
F. D. Libby
Albert Bankus
G. Lamont Bidwell, Jr.
M. P. Chaplin
J. L. Parsons

1941

W. H. Swanson
R. A. Hayward
V. P. Edwardes
H. H. Harrison
R. C. Griffin
F. D. Libby
Albert Bankus
G. Lamont Bidwell, Jr.
M. P. Chaplin
I. L. Parsons
Pierre Drewsen
H. H. Hanson
B. D. Millidge
G. W. E. Nicholson

The Technical Association Sections

From the beginning it has been recognized by the leaders of the Technical Association that to serve its members it is necessary to consider a regional setup. In the early days when the membership was small this need led to the holding of at least one national meeting each year in a pulp and paper center outside of New York City.

There were a few early attempts to get local organizations under way in the Miami Valley and in Holyoke. Later a group called the Paper Technologists Club was formed in the Kalamazoo Valley which later was expanded in scope and became a local section of the association. In most cases these local groups were informal in organization and had no recognized standing in the national body.

In 1929 the executive committee gave serious consideration to the establishment of local sections, provided for financial assistance and suggested a form of self government or articles of organization for such groups.

The Pacific Section

For some time prior to the fall of 1928 there had been discussion about forming a Pacific Coast technical organization and in September 1928 H. K. Benson of the Department of Chemistry and Chemical Engineering issued a call for a meeting in October at the University in Seattle. About one hundred attended. The purpose of the meeting was stated to be a discussion of the cooperation of the industry with educational and research institutions.

At this meeting a resolution was passed to authorize the chairman (Dr. Benson) to invite each of the operating mills to designate a representative to serve on a committee to work out plans for future conferences of the pulp and paper industry of the Pacific Coast. In response to this request twelve men met at the New Washington Hotel in Seattle on January 12, 1929 and unaminously went on record in favor of the establishment of a Pacific Section of the Technical Association, framed a resolution setting forth their view and dispatched it to R. G. Macdonald, secretary-treasurer of the National organization.

Present at the Seattle meeting were Robert H. Scanlon and Robert Bell-Irving of the Powell River Company; E. B. Brennan of the British Columbia Pulp and Paper Company; F. C. Brewer, Shafer Box Company; Ralph Reid, St. Helens Pulp and Paper Company; Myron Black, Inland Empire Paper Company; Robert Bundy, Fibreboard Products Company; C. B. Everitt, Fidalgo Pulp Company; Erik Ekholm, San Juan Pulp Manufacturing Company; William Breitenbach, Ranier Pulp and Paper Company; B. T. McBain, Northwestern Pulp and Paper Company and H. K. Benson, University of Washington.

At the annual meeting of the association in February, the executive committee instructed and authorized Secretary Macdonald to make a trip to the Pacific Coast as soon as possible to arrange for the formation of the Pacific Section.

Actual organization of the Pacific Section took place on Saturday evening, June 22, 1929, at the New Washington Hotel in Seattle, Wash. Thirty-three men took part and after hearing an outline of the work of the Technical Association by R. G. Macdonald, secretary-treasurer, elected officers to serve until the fall meeting.

The first officers of the Pacific Section were: Chairman—C. R. P. Cash, Cascade Paper Company, Tacoma, Wash.; Vice Chairman—R. M. DeCew, Fibreboard Products, Inc., Sumner, Wash.; Secretary-Treasurer—Professor H. K. Benson, University of Washington, Seattle.

The first meeting of the section after its organization was at the Winthrop Hotel in Tacoma, Wash., on October 5, 1929. P. H. Glatfelter, president of the association and of the P. H. Glatfelter Company, Spring Grove, Pa., attended and addressed the group, stressing the work of the association as an aid to each man in his everyday work. He urged the new section to work closely with the national body on technical matters. An election was held in which R. S. Wertheimer of the Longview Fibre Company was elected Chairman, Ralph Reid of the St. Helens Pulp and Paper Company, vice chairman and H. K. Benson was reelected secretary-treasurer. Twenty-seven men were present to hear the technical paper presented.

An excellent detailed history of this section appeared in the August 1940 issue of the Pacific Pulp and Paper Industry.

An interesting feature of the annual meetings of the section have been the presence of men from the East who participated in the programs. These have included many of the presidents of the association, the secretary has made frequent visits, C. M. Baker, B. W. Scribner, H. F. Lewis, C. E. Curran, C. W. Boyce, H. R. Murdock and others.

In September 1934 the Pacific Section was host to the fall convention of the Technical Association at Portland, Ore. Under the able chairmanship of H. Robert Heuer of the Longview, Wash., mill of the Weyerhaeuser Timber Company, one of the greatest fall meetings of the association was arranged. About five hundred men and women were present, many from the East who were making their first visit to the Pacific Coast. They were impressed with the great resources of the Northwest. The trip to the Weyerhaeuser woodlands was a highlight of the meeting and is still talked about. Clark C. Heritage, then of the Oxford Paper Company was President and took back with him a ten gallon hat full of memories of a most enjoyable and educational meeting.

It is unfortunate that space does not permit a full report concerning this and other meetings held on the Coast and of the many individuals who have contributed so much to their success. This leadership can at least be symbolized by listing the names of those who have been chairmen. These include: C. R. P. Cash, Cascade Paper Company, Tacoma, Wash.;

R. S. Wertheimer, Longview Fibre Company, Longview, Wash.; C. W. Morden, Consulting Engineer, Portland, Ore.; R. B. Hansen, Weyerhaeuser Timber Company, Longview, Wash.; Lawrence Killam, British Columbia Pulp and Paper Company, Vancouver, B. C.; M. W. Black, Inland Empire Paper Company, Spokane, Wash.; W. R. Barber, Crown Zellerbach Company, Camas, Wash.; Carl Fahlstrom, Longview Fibre Corporation, Longview, Wash.; G. H. McGregor, Weyerhaeuser Timber Company, Longview, Wash.; N. W. Coster, Soundview Pulp Company, Everett, Wash., and Fred Olmsted, Crown Zellerbach Company, Camas, Wash. The present chairman is Carl E. Braun, vice president of the Hawley Pulp and Paper Company, Oregon City, Ore. The vice chairman is E. P. Wood of the Pulp Division, Weyerhaeuser Timber Company, Longview, Wash., and the secretary-treasurer is Fred C. Shaneman, Pennsylvania Salt Manufacturing Company, Tacoma, Wash.

Annual meetings in recent years have been held with the Pacific Division of the A.P.P.M. Superintendents Association. At the 1935 meeting, Albert Bankus, vice president of the Crown Zellerbach Corporation and member of the national executive committee of the association wrote in complimenting the men on holding joint meetings:

"Besides the value of working together in the individual mills, I think the program of meeting together promises another distinct value. When the operating men who present the problems and must use the answers, meet with the technical men who study the problems and offer the answers, I feel that the meeting itself, without losing the necessary features of good fellowship and entertainment, is bound to emphasize the serious business which brings the two groups together."

In 1936 the first full year of following a policy of holding monthly regional meetings was noteworthy. These meetings were held in Portland, Seattle, Vancouver, B. C., Olympia, Everett, Tacoma and Port Angeles. This policy has continued.

In 1939 the section announced the Shibley Award, a prize of fifty dollars to be given to the mill man presenting a paper before the section that is judged the best from the standpoint of technical excellence, presentation and reception by the audience. The award was named after Kenneth Shibley, water treatment engineer of Seattle who passed away in May 1937 and who had first suggested the award. This has stimulated the presentation of papers by mill men, especially by the younger men. The presentation of such an award by the Pacific Section is unique among the sections of the Technical Association at the present time.

In 1940 the national association again held its fall convention on the Pacific Coast, this time at Seattle, under the able chairmanship of G. S. Brazeau of the Everett, Wash., mill of the Weyerhaeuser Timber Company. As in 1934 it was again an outstanding success both in attendance and program feature.

More than two hundred papers have been presented at the Pacific Section meetings. The value of the work done for the industry in this region and to the men themselves cannot be calculated but the record of the work done proves the service has been very great.

Lake States Section

The Lake States Section was organized by Otto Kress of the Institute of Paper Chemistry and held its first meeting at the Menasha Hotel, Menasha, Wis., on October 17, 1930.

Most of its meetings have been held monthly from October until May in the Conway Hotel, Appleton, Wis., although some meetings have been held at Madison, Wausau, Wisconsin Rapids and Green Bay. The section has had an excellent record and has benefitted considerably because of the proximity of the Institute of Paper Chemistry in Appleton and the Forest Products Laboratory in Madison. The staff of both of these institutions have contributed much through the presentation of papers and the assistance of personnel.

G. K. Hill of the Gilbert Paper Company was its first chairman. He has been followed in sequence by Otto Kress; R. J. LeRoux, Interlake Division, Consolidated Water Power and Paper Company; A. T. Gardner, Combined Locks Paper Company; S. D. Wells, Consulting Engineer; J. R. Fanselow, Kimberly-Clark Corporation; H. W. Morgan, Institute of Paper Chemistry; E. H. Voigtman, Kimberly-Clark Corporation; R. A. Nugent, Nekoosa-Edwards Paper Company and M. L. Downs, Thilmany Pulp and Paper Company.

The present officers are: Chairman—N. L. Malcove, Northern Paper Mills; Vice-Chairman—John H. Graff, Institute of Paper Chemistry; Secretary-Treasurer—Wm. J. Plank of J. J. Plank and Company.

The Section has twice been host to the national Association fall meeting. In 1933 the meeting was held in Appleton, Wis., and at Green Bay, Wis. Aside from the technical program the Appleton meeting was featured by a visit to the new buildings of the Institute of Paper Chemistry and the Green Bay meeting by an inspection of the new boiler house of the Northern Paper Mills and a professional football game between the famous Green Bay Packers and Cleveland. Otto Kress was general chairman of the Appleton convention and Ag. B. Hansen, vice president of the Northern Paper Mills was general chairman of the Green Bay convention.

Delaware Valley Section

The Delaware Valley Section was organized in June 1931 in Philadelphia by Harvey P. Cannon, William R. Maull, C. W. Rivise, W. M. Shoemaker, and H. C. Schwalbe.

Regular meetings were started in the fall of 1932 and have been held almost continuously at the Engineers Club in Philadelphia, now on the first Friday evening of each month. The membership is at present 165.

The Section sponsored a fall convention of the national organization at Atlantic City, N. J., in 1935, of which William R. Maull was general chairman. A number of meetings have been held jointly with the Pennsylvania-New Jersey-Delaware Division of the A.P.P.M. Superintendents Association.

Although a dinner-dance is held annually at one of the country clubs near Philadelphia the programs have been of a serious nature and have covered cost accounting and personnel relations in addition to a vast number of technical subjects. A feature of this section is that a stenographic report is taken of all discussions and sent to each member as a service. This innovation has been successful in developing interest in the sections meetings. A meeting is held in the latter part of each summer to organize the program for the coming nine months.

The chairmen of the Section have been W. R. Maull, Dill & Collins, Inc., Philadelphia; G. E. Landt, Continental-Diamond Fibre Company, Bridgeport, Pa.; H. P. Cannon, Container Corporation of America, Manayunk, Pa.; H. C. Schwalbe, Dill & Collins, Inc.; J. d'A. Clark, Scott Paper Company, Chester, Pa., and C. M. Connor, Valley Forge Laboratories, W. Conshohocken, Pa.

The present officers are: Chairman—Edward J. Albert, Thwing-Albert Instrument Company, Philadelphia; Vice Chairman—J. R. Atwater, Dill and Collins, Inc.; Secretary—J. D. Davis, Dill and Collins, Inc. and Treasurer—F. J. McAndrews, McDowell Division, Glassine Paper Company, Manayunk, Pa.

Kalamazoo Valley Section

The Kalamazoo Valley Section was organized at Kalamazoo, Mich., on May 4, 1931 as the successor to the Paper Technologists Club which had functioned for a few years prior to this. (founded in 1927)

Its meetings are held monthly on the first Thursday at the Park American or Columbia Hotels in Kalamazoo and are of the usual vital type in which important technical subjects are thoroughly discussed.

A feature of the annual program of the section is its annual joint meeting, held with the Michigan Division of the A.P.P.M. Superintendents Association. These meetings which now attract nearly four hundred were instigated by the much revered Mike Redmond of the Kalamazoo Paper Company and Ralph A. Hayward of the Kalamazoo Vegetable Parchment Company. In addition to the regular attendants from the two local organizations a special effort is made to bring out the mill operators, machine tenders, department foremen, etc. Officers of both national organizations are present and a prominent speaker is obtained to present a subject of popular interest. "Uncle Jake" Kindleberger of K.V.P. and formerly Mike Redmond, while he was active, have added much of interest and value in their observations and remarks.

The section was host to the national body in sponsoring the fall convention of 1931. Again, this year (1941) the section is functioning as host to the association at its unique Ann Arbor meeting, featuring as it does the present great program of national defense and the part that the pulp and paper industry is taking therein.

The Section maintains a loan fund to help finance the education of students who expect to prepare for the paper industry.

The chairmen of the section have been M. D. Bardeen, Lee Paper Company, Vicksburg, Mich.; E. F. Whittington, Sutherland Paper Company, Kalamazoo; H. C. Bradford, Rex Paper Company, Kalamazoo; C. C. Schneider, Hawthorne Paper Company, Kalamazoo; H. M. Annis, Allied Paper Mills, Kalamazoo; M. R. Wilkins, Bryant Paper Company, Kalamazoo; W. F. Hathaway, Kalamazoo Vegetable Parchment Company, Parchment, Mich.; Paul de Guehery, Michigan Paper Company, Plainwell, Mich.; W. A. Kirkpatrick, Allied Paper Mills; and W. K. Kidder, Bryant Paper Company, Kalamazoo.

The present officers are: Chairman—Fred L. Chappell, Jr., Sutherland Paper Company, Kalamazoo; Vice Chairman—Fred D. Elliott, Kelly Ink Company, Kalamazoo; Secretary—Arthur Weinland, Lee Paper Company, Vicksburg, Mich. and Treasurer—Frank Hamilton, Allied Paper Mills, Kalamazoo.

New England Section

Miss Helen U. Kiely, chief chemist of the American Writing Paper Company and secretary of the New England Section has contributed the following and interesting and informative report concerning the history and activities of this very successful Section.

Miss Kiely has been secretary during the entire period of New England TAPPI's existence and is greatly responsible for its fine record because of her untiring and always enthusiastic leadership. She has been ably assisted by Misses Mary Walsh and Lena Kelly of her company on administrative affairs concerning the section, and by Misses Ella Norris and Bessie Sullivan in the social features of the meetings. Anyone familiar with this organization in the Connecticut Valley can well understand how important it is to mention the part played by these women in regard to the local organization.

"The New England Section of TAPPI was organized in November, 1932 and received its charter in April of the following year. It has been holding eight meetings a year on the third Friday of each month, the first meeting being held in October and the last in May. The February meeting is omitted due to the National meeting being held in New York at that time.

"The section has a chairman, a vice chairman, a secretary, a treasurer and an executive committee consisting of eight members. The dues for each member are $1.50 per year and membership is open to persons in any capacity connected with the paper industry or an allied industry. The dues and the rebate given by the national organization for active members have financed the New England Section. The cost of running the Section averages around $300 per year. The section this year has established a fund for a contest to the member presenting the best paper during the year. It is hoped that this will encourage the younger men to prepare and present papers of interest during the coming year. The capital prize will be $50 and it is hoped that sufficient funds will be available to allow two memberships in National TAPPI.

"The programs are arranged by the executive committee, each member on it being responsible for one meeting. For the majority of our meetings we have one speaker and a moving picture film or if the subject is of interest we have two speakers on the same

subject or an allied subject. Six of our meetings are held in Holyoke, one in the Berkshires and one in the Fitchburg district to keep the interest of our members in the outside localities. One of the meetings, either the last or the first of the season is a social one with golf and bridge tournaments at which prizes are given by the section.

"We have tried to have speakers on subjects of interest to our varied membership so that most of our speakers have been drawn from companies supplying the industry, such as speakers on machine equipment, rosin sizing, starch and gum sizing, white water, corrosion problems, coating, color, printing problems, permanency, physical testing. During the past year the program of most interest was an "Information Please" at which a Board of Experts answered some fifty questions that had been submitted by the members of the Section. I believe a meeting of this type, where all members find some subject of interest discussed, is the most desirable.

"Whenever possible the section has cooperated with the Connecticut Valley Superintendents Division in having joint meetings and many fine ones have been held jointly.

"The New England Section sponsored the formation of the Maine group last year because it was felt that the distances for active participation in the present local section were too great and that there were a sufficient number of men in Maine and New Hampshire who would be interested in holding meetings more conveniently than in western Massachusetts.

"The average attendance at our meetings, which are always dinner meetings, is seventy-five with twenty-five or more attending the meetings only. The section is well established and all the members look forward to TAPPI night for both the social and educational advantages."

The section was host to a national fall meeting in 1932 at the Nonotuck Hotel in Holyoke.

Former chairmen were: Frederic C. Clark, consulting engineer. Boston, Mass.; Roger C. Griffin, Arthur D. Little, Inc., Cambridge, Mass.; John B. Calkin, Dennison Manufacturing Company, Framingham, Mass., and R. H. Doughty, Fitchburg, Paper Company, Fitchburg, Mass.

The present officers are: Chairman—Norman I. Bearse, Champion-International Company, Lawrence, Mass.; Vice Chairman—W. L. Foote, B. F. Perkins and Son, Holyoke, Mass.; Secretary—Helen U. Kiely and Treasurer—Hermon T. Barker, Bird and Son, East Walpole, Mass.

Ohio Section*

Early in 1934 an organizing committee consisting of J. H. Wallace, Ralph B. Roe, George H. Harvey, O. P. Gephart, J. F. Ohlson, E. C. Hendrickson, Carl D. Roess and V. F. Waters met to ascertain the advisability of forming a local section of the Technical Association. This committee arranged a meeting of the technical men in the Miami Valley on November 20, 1934.

*Report prepared by Duncan S. Brown, secretary, Gardner-Richardson Company, Middletown, Ohio.

The success of this meeting led to another which was held on April 20, 1935 in Middletown at which time the group decided to apply for a local section charter from the national organization. The first officers elected were: Chairman—Vincent F. Waters, Wrenn Paper Company; First Vice Chairman—J. J. O'Connor, Mead Corporation; Second Vice Chairman—Homer H. Latimer, Beckett Paper Company; Secretary-Treasurer—Carl D. Roess, Wrenn Paper Company, and Executive Committeeman—George H. Harvey, Gardner-Richardson Company. At this meeting Robert F. Reed of the Lithographic Technical Foundation discussed "Lithography and Paper" and George C. Munro of the Champion Paper and Fibre Company described the General Electric Reflection Meter.

The charter was formally presented to the section by C. C. Heritage, president of the Association, at Middletown on October 19, 1935 and the above officers were reelected.

The section has held a number of very interesting meetings which have been recorded in the various editions of the TAPPI Year Book. Of particular interest was the meeting on October 14, 1939, held jointly with the Miami Valley Division of the A.P.P.M. Superintendents Association at which time George H. Harvey was the guest of honor and received on the part of the two organizations a plaque citing him for his many years of fine service to the industry and for his personal efforts in encouraging the aims and ideals of the two associations. This plaque was presented by Homer H. Latimer and E. T. Gardner, president of the Gardner-Richardson Company commented on his long and pleasant association with Mr. Harvey. Many telegrams and testimonial letters were received from Mr. Harvey's host of friends and read at this meeting.

It is interesting to note the cordial relationship that exists between the Ohio Section and the Miami Valley Division. Since 1936 all meetings have been held jointly with one organization in charge of half of the meetings and the other in charge of the remainder.

In January of each year, as in the case of the Kalamazoo Valley Section, a very highly attended meeting is held jointly by the two organizations, at which time a prominent speaker such as George H. Mead, president of the Mead Corporation and the national officers of the two Associations address the gathering.

The past chairmen of the Ohio Section are Vincent F. Waters, Wrenn Paper Company, Middletown, Ohio; H. H. Latimer, Beckett Paper Company, Hamilton, Ohio; K. P. Geohegan, Aetna Paper Company, Dayton, Ohio, and J. E. Burdsall, Crystal Tissue Company, Middletown, Ohio.

The present officers are: Chairman—Harry C. Fisher, Gardner-Richardson Company, Lockland, Ohio; First Vice Chairman—Valentine Friedrich, Beckett Paper Company, Hamilton, Ohio; Second Vice Chairman—H. H. Harrison, Crystal Tissue Company, Middletown, Ohio, and Secretary-Treasurer—Duncan S. Brown, Gardner-Richardson Company, Middletown, Ohio.

Empire State Section

The Empire State Section began holding meetings in 1935 and received its charter from Frederic C. Clark, president of the Association, on April 2, 1938, the presentation being made by R. G. Macdonald, secretary-treasurer of the national organization.

About four meetings are held annually, at least one of which is held jointly with the New York-Canadian Division of the A.P.P.M. Superintendents Association and occasionally with the Niagara Chapter of the Technical Section of the Canadian Pulp and Paper Association.

The present officers of the Section are: Chairman—H. D. Cook, Sweet Brothers Paper Company, Phoenix, N. Y.; Vice Chairman—Vance P. Edwardes, International Paper Company, Palmer, N. Y.; Secretary-Treasurer—F. W. O'Neil, New York State College of Forestry, Syracuse, N. Y.; Executive Committee—Harvey P. Cannon, Mutual Boxboard Company, Utica, N. Y.; Fred C. Goodwill, St. Regis Paper Company, Deferiet, N. Y.; F. J. Lang, International Paper Company, Tonawanda, N. Y. and R. I. Wynne-Roberts, Finch, Pruyn Company, Glens Falls, N. Y.

The past chairmen has been: John Schuber, Solvay Process Company, Syracuse, N. Y.; C. E. Libby, New York State College of Forestry; J. H. Rich, Newton Falls Paper Company, Newton Falls, N. Y.; R. F. Huntley, The Sealright Company, Inc., Fulton, N. Y., and F. C. Goodwill, St. Regis Paper Company.

Unaffiliated Groups

The association has followed a policy of requiring regional groups to organize and hold several meetings before granting any petition for local section charters. At the present time three organizations are in this category, namely the Southern States Pulp and Paper Club which has met at Charleston, S. C., Savannah, Ga. and Jacksonville, Fla., and of which R. H. Laftman of the National Container Corporation is Chairman; the Maine-New Hampshire Group which met last fall at Orono, Maine and of which Worthen E. Brawn of the Pejepscot Paper Company is Chairman; and the Papermakers and Associates of Southern California which met in June in Los Angeles, Calif., and of which Herman L. Joachim, consulting engineer of Los Angeles is chairman. A continuous record of good meetings and good organization will entitle these organizations to consideration for local section charters in a reasonable length of time.

The TAPPI Medal Awards

One of the greatest distinctions that can come to a man in the pulp and paper industry is the award of the gold medal of the Technical Association. To date there have been but nine recipients. The candidate is selected by the executive committee (with not more than one dissenting vote permitted) and is given to individuals whose achievements have contributed to the technical progress of the pulp and paper industry.

Following is a brief review of the history and accomplishments of the medallists:

William H. Mason (1928)

William H. Mason was born in West Virginia and received his education at Washington and Lee University, later studying mechanical engineering at Cornell University. During the Spanish-American War he served as an ensign in the navy and then went with Thomas A. Edison for the ensuing 16 years. At the outbreak of the World War he accepted the position of general superintendent of construction for the government shipyards at Bristol, Pa., where in 11 months he built up an organization of 8,000 men and completed twelve ship ways as well as a large town site. After the war he did some development work for General Motors on a hydraulic transmission. In 1920 Mr. Mason went to Laurel, Miss., where he developed a process for extracting naval stores from lumber during the course of manufacture. Four of these plants were built and are now in successful operation. Mr. Mason then turned his attention to the possibility of exploding wood fiber with high-pressure steam and after a prolonged series of experiments worked out the methods which now form the basis of operation in the Masonite Corporation's plant. The value of such a process for converting wood refuse into high grade substitutes and supplements for lumber cannot be overestimated in these

W. H. Mason
Medalist—1928

Ogden Minton
Medalist—1928

Ernst Mahler
Medalist—1933

Edwin Sutermeister
Medalist—1935

W. H. Millspaugh
Medalist—1936

C. J. West
Medalist—1937

C. B. Thorne
Medalist—1938

J. N. Stephenson
Medalist—1939

Otto Kress
Medalist—1940

days when the necessity for full utilization of our forests is being appreciated. As an engineering contribution, Mr. Mason's pioneer work in this new method of defibering stands out in the pulp and paper industry.

Ogden Minton (1928)

Ogden Minton's career and achievements exemplify the fact that outstanding developments are generally the combination of a thoroughly trained mind, a practical understanding of the goal to be reached, unlimited confidence in ultimate success and a tremendous amount of hard work. Mr. Minton was born in Brooklyn in 1885 and was educated in the Brooklyn Polytechnic Preparatory School, and like Mr. Mason was later graduated from Cornell University. After a number of years' experience in engineering and financial matters, Mr. Minton went into the engineering department of the American Writing Paper Company at Holyoke, Mass. He then served as a Captain of Ordnance during the World War, after which he spent a year recuperating from a severe attack of influenza. It was then that Mr. Minton decided to turn his full efforts to developing the vacuum drier, an idea first conceived in 1914 and patented in 1915. He gathered around him a small staff of technical men who subsequently devoted almost 5 years to thermodynamic and engineering studies in order to design and build full-size driers. The first ones were installed for the Armstrong Cork Company, the Bakelite Corporation, and Price Bros. & Company Ltd. More recently vacuum driers have been installed on the Pacific Coast and in Europe.

Ernst Mahler (1933)

The medal award in 1933 went to Ernst Mahler, vice president of the Kimberly-Clark Corporation, Neenah, Wis. The award was made during the fall meeting of the association held at Appleton, Wis., on Sept. 27, 1933. Mr. Mahler is a graduate of the Technische Hochshule at Darmstadt, Germany, and came to the United States in 1910 to represent the Badische Company as a dyestuff expert. In 1914 he became associated with the Kimberly-Clark Corporation. Among his contributions to progress are the following: the development of a bleached groundwood sheet used in the manufacture of book, magazine, rotogravure, and other printing papers; the development of cellucotton; aid in the development of a forced circulation system for sulphite cooking; the development of the Niagara beater. He also brought equipment and processes from Germany, such as the Voith inlet, the screw press, and improved pulp screen. In 1915, he helped to organize the Technical Association of the Pulp and Paper Industry and he is the founder of The Institute of Paper Chemistry.

Edwin Sutermeister (1935)

The fourth individual to receive the medal was Edwin Sutermeister, chief chemist of S. D. Warren Company, Cumberland Mills, Me. Mr. Sutermeister was born in Milton, Mass., and was graduated from the Massachusetts Institute of Technology in 1899. He was employed as a chemist in the U. S. Forest Service in Washington, D. C., and Madison, Wis., from 1907 to 1910. With the exception of these years, he has been with S. D. Warren since 1899. The medalist is probably most widely known as the author of "The Chemistry of Pulp and Paper Making," a book published by John Wiley & Co., which has run into two large editions. He is also the author of one of the American Chemical Society Monographs "Casein and its Industrial Applications." He was the originator of the pebble mill test for evaluating paper pulp. The great improvement in wood pulp during the past 20 years may be largely attributed to the testing work done by consumers of pulp. His other particular technical interests include the development and introduction of domestic clays for loading and coating of paper, the development of starches and gums for coated paper work, improvements in soda pulping and size manufacture and application.

William H. Millspaugh (1936)

William H. Millspaugh was born in 1869 and had his first dealings with the paper industry in 1895 while a salesman for the Deming Pump Company of Salem, Ohio. His first invention for the paper industry was a paper machine shower pipe that economized in the use of water. In 1902, he organized the Sandusky Foundry and Machine Company. In 1906, he designed an improved suction roll and subsequently developed one of outstanding success for use as a couch roll, to be used with a continuous flow rotary pump of the cycloidal type or the equivalent. This made high speeds for paper machines possible. Next followed the suction press roll. His development of

a method for making castings centrifugally was a contribution to the metallurgical field. Finally his invention of a vacuum forming paper machine proved to be a success. This brought together most of his inventions, many of which dealt with details in suction roll design and construction and with many paper machine parts.

Clarence J. West (1937)

Clarence J. West was born at Brighton, Mich. in 1886 and received his doctorate from the University of Michigan in 1912. At present (1941) he is editor of publications of The Institute of Paper Chemistry, Appleton, Wis. Dr. West is best known in the paper industry for his outstanding work in the preparation of bibliographies of the pulp and paper literature. His bibliographies in bound volumes cover the period from 1900 to date. He has published more than 550 books, articles, translations, book reviews, etc. During the World War he was a Lieut. Colonel in the Chemical Warfare Service and was a collaborator in writing the first book on the subject. His first contact with the paper industry was made in 1919 when he was director of the information service of Arthur D. Little Inc. Since 1920 he has been assistant editor of the Organic Section of *Chemical Abstracts*. In a similar capacity with the National Research Council he was editor of the International Critical Tables and the Annual Survey of American Chemistry. He was associated with the committee appointed by the National Bureau of Standards in 1921 to prepare a book on the classification and definitions of paper, and since 1920 he has been chairman of the TAPPI Abstracts and Bibliography Committee.

Carl B. Thorne (1938)

Carl B. Thorne was born at Moss, Norway, and studied both mechanical and chemical engineering at Hanover and Dresden Universities in Germany. On leaving the university he immediately became associated with sulphite pulp manufacture and worked for a number of years as both chemist and engineer in various sulphite mills in Germany and Norway. In 1902, he came to this continent to study the manufacture of paper and in the following year joined the staff of the Riordon Company as engineer and sulphite expert for their mills at Hawkesbury and Merritton. He was appointed manager of the Hawkesbury Mill in 1905, and later also took over the management of the Merritton Mill. He designed and erected in Hawkesbury the first reinforced concrete towers for the manufacture of sulphurous acid. These towers known as "Jenssen acid towers" are now generally accepted, and are used in all parts of the world. Other developments and contributions to the sulphite industry followed quickly, some of which are an SO_2-reclaiming system, a radically new and different type of log barking machine which effectively removes the bark from logs of any length up to 16 feet or even longer. Perhaps his more important contribution to the pulp industry is his continuous and multiple stage bleaching systems.

J. Newell Stephenson (1939)

J. Newell Stephenson was born in New Rochelle, N. Y., in 1882 and graduated from the Massachusetts Institute of Technology in 1909. From 1910-1913, he was on the faculty of the Rose Polytechnic Institute and was one of the organizers of the pulp and paper course of the University of Maine where he taught from 1913-1916. Since 1917, he has been editor of the *Pulp and Paper Magazine of Canada* and of the textbooks, "The Manufacture of Pulp and Paper," published by the McGraw-Hill Book Company, under the supervision of the Joint Textbook Committee of the Technical Section of the Canadian Pulp and Paper Association and the Technical Association of the Pulp and Paper Industry. Since 1922, he has been principal of the Institute of Industrial Arts, Gardenvale, P. Q. and has been a contributor to the technical literature of the pulp and paper industry.

Otto Kress (1940)

The ninth medal award went to Otto Kress. Dr. Kress received his doctorate of philosophy from Columbia University in 1909 and had previously received the Illig medal from Columbia. Following this he spent a few years with the Badische Company and during the World War became chief of the Pulp and Paper Section of the Forest Products Laboratory, Madison, Wis. This was followed by association with the Consolidated Water Power and Paper Company, Wisconsin Rapids, Wis., E. I. du Pont de Nemours & Company, Wilmington, Del., Thilmany Pulp and Paper Company, Kaukauna, Wis., private consultant practice, and in 1929 became technical director of The Institute of Paper Chemistry, Appleton, Wis. Dr. Kress has published more than 50 technical articles and has been granted many patents for inventions in the pulp and paper industry.

TAPPI Financed Research*

The research appropriation committee (formerly the committee on educational cooperation) was organized in 1935 under the direction of Clark C. Heritage, president of the association to assist the committees of the Association in their various projects where financial aid was required. With the assurance of the help of a research grant important projects can be undertaken by committees, and these projects can be brought more rapidly to a successful conclusion than theretofore.

To administer these research funds, the research appropriation committee, comprising the vice presi-

*Report prepared by John L. Parsons, Hammermill Paper Company, Erie, Pa., Chairman, TAPPI Research Appropriation Committee.

dent, the chairmen of the various divisions and a chairman, was appointed. Usually an undesignated sum of money is available each year for the purpose of assisting committees in their activities. Since 1935 an amount in excess of $12,000 has been requested by, and granted to, committees for their various projects.

Applications for research funds must originate in a committee. Any Technical Association committee desiring financial assistance for any of its projects can apply for a research grant through the chairman of its division who is a member of the research appropriation committee. The information to be supplied concerning a project, for which financial aid is to be requested, should preferably be grouped under the following headings:

A. Name and definition of work to be carried out.
B. Description of subject and results desired.
C. Need for results desired and assurance that it has not been done elsewhere.
D. Where and by whom will the work be carried out.
E. Estimated time and cost.

Normally the TAPPI research grants are for a period of one year or less, and for a number of projects the grants have been renewed several times. The results of each investigation, financed in part or as a whole by TAPPI funds, are made available to the membership through the Association's publications. Before publication, however, all papers relating to such projects must be approved by (1) the chairman of the sponsoring committee, (2) the respective division chairman, and (3) the Vice President of the Association. This approval is greatly facilitated by the author submitting three copies of his paper to the chairman of the sponsoring committee.

Appropriation Granted and Reports Published

1. To the mechanical pulping committee, the sum of $150 to purchase a pulp classification screen to be used in connection with a committee project wherein the action of various mechanical pulp refiners was studied. The work was done at the University of Maine, Orono, Maine, under the supervision of P. D. Bray and M. P. Chaplin, 1935. The final report on this project was published under the title of "Fractionation of mechanical pulps and its relation to refining," by Paul D. Bray, Robert A. Thompson, and Jiun Shyr. Paper Trade J., 104, TAPPI Sect. 49 (Feb. 4, 1937); Tech. Assoc. Papers XX; 167-168 (June, 1937).

2 and 9. To the fundamental research committee, the sum of $1,000 to study the existence and nature of fiber membranes. The original grant made in 1936 was renewed in 1937. The work has been carried on by F. E. Brauns and associates at the Institute of Paper Chemistry, Appleton, Wis. The final report was published by Lewis, Brauns and Buchanan in Tech. Assoc. Papers, XXII; 475-477, (June, 1939). Earlier reports by Lewis and others on this investigation have appeared as follows: Tech. Assoc. Papers, XIX:24-25 (June, 1936); XX:268B-370 (June, 1937); XXI:456-457, 490 (June, 1938).

3. Cancelled at request of container committee.

4 and 8. To the fibrous materials testing committee, the sum of $600 for the development of an analytical method for the determination of lignin, Cross and Bevan cellulose and easily hydrolyzable cellulose on the same sample of wood, data to be obtained on several species of pulpwood. Work to be done at the Forest Products Laboratory, Madison, Wis., under the direction of G. A. Ritter, 1936. The grant was renewed for continued work on this project in October, 1937, under the sponsorship of the fibrous materials testing committee. Four progress reports on this investigation have been prepared by Van Beckum and Ritter and published in the Paper Trade J., TAPPI Sect. 253-254 (May 13, 1937); Tech. Assoc. Papers XXI:334, 431-434 (June, 1938); Tech. Assoc. Papers XXII:619-622 (June, 1939). This project is continued under the sponsorship of the fundamental research committee in 1938. (See item 10).

5. To the microscopical subcommittee of the paper testing committee, the sum of $220 to prepare a bibliography on the microscopy of paper. The work was done at the Massachusetts Institute of Technology under the direction of J. B. Calkin, 1936. Published in 1937 as Special Bibliographies Series, No. 1.

6. To the fundamental research committee, the sum of $600 for the development of a method of measuring the degree of gelatinization of cellulose and wood. The work is being done in the Wood Conversion Laboratory of the School of Forestry, University of Idaho, Moscow, Idaho, under the direction of E. C. Jahn, 1936. A progress report was published in Tech. Assoc. Papers XXI:350-352 (June, 1938). The final report of the investigation by Sedoff, Holmberg and Jahn appeared in Tech. Assoc. Papers XXII:281-288 (June, 1939).

7. To the preparation of nonfibrous materials committee, the sum of $75 for the investigation of the effects of impurities and of alkalinity on the stability of bleach liquor (calcium hypochlorite). The final report of the investigation was published in Tech. Assoc. Papers XXI:204-206 (June, 1938).

8. See item 4.

9. See item 2.

10. To the fundamental research committee, the sum of $600 in 1938 for the continuation of the project on holocellulose initiated by the fibrous materials testing committee (See item 4 and 8). A report of this part of the investigation was published by Van Beckum and Ritter in the Paper Trade J., 109 TAPPI Sect., 299-301 (Nov. 30, 1939).

11. To the fundamental research committee, the sum of $1000 in 1938 for an investigation of the relation of lignin content to the strength of paper and pressed boards. The project is being carried out by C. V. Holmberg under the direction of E. C. Jahn at the New York State College of Forestry, Syracuse, N. Y. A literature survey and progress report was published in the Paper Trade J. 109, TAPPI Sect., 164-169 (Sept. 28, 1939); Tech. Assoc. Papers XXIII:626-631 (June, 1940).

12. To the fundamental research committee, the sum of $1000 in 1939 to continue the project on holocellulose (See item 10). The objective of this phase of the study was the modification of the properties of holocellulose to make it comparable to bleached chemical pulp. The work, carried out by G. J. Hajny, a graduate student, under the supervision of G. J. Ritter, at the U. S. Forest Products Laboratory, Madison, Wisconsin, was reported in the Paper Trade J. 111, TAPPI Sect., 281-284 (Nov. 28, 1940).

13. To the materials of construction committee, the sum of $540 in 1939 for the purpose of (1) completing a survey of the materials of construction used in kraft mills (omitting the bleach plant), (2) making a survey of the materials of construction used in the bleach plant, and (3) investigating the use of piping in the pulp and paper industry. The final report on this project was published by James A. Lee in the Paper Trade J. 110, TAPPI Sect. 284-290 (May 23, 1940); Tech. Assoc. Papers XXIII: 422-428 (June, 1940).

14. To the fundamental research committee, the sum of $1000 in 1939 to continue the project described in item 11. A report on this part of the study was published by C. V. Holmberg and E. C. Jahn in the Paper Trade J. 111, TAPPI Sect., 1-4 (July 4, 1940); Tech. Assoc. Papers XXIII:128-131 (June, 1940).

15. To the fibrous materials testing committee, the sum of $750 in 1939 for studying the use of hydroxamines for the determination of cellulose in wood and pulps. The study is being carried out at the New York State College of Forestry, Syracuse, N. Y., under the direction of E. C. Jahn.

16. To the paper testing and pulp testing committees, the sum of $250 in 1940 for the preparation of a negative for the printing of charts to be used for the estimation of dirt in pulp or paper, according to tentative standard methods T 213 m-39 and T 437 m-39. The work is being done under the supervision of John Graff, with the assistance of James d'A. Clark, at the Institute of Paper Chemistry, Appleton, Wis.

17. To the fundamental research committee, the sum of $1200 in 1940 to continue the investigation on holocellulose and specifically to develop a practical process for the isolation of holocellulose suitable for making high-grade alpha-cellulose and a wide variety of papers. The work is being continued at the U. S. Forest Products Laboratory, Madison, Wis., by George J. Hajny and George J. Ritter. A report on the study will be given at the 1941 Fall TAPPI Meeting, Ann Arbor, Mich.

18. To the fundamental research committee, the sum of $1000 in 1940 to continue the project described in items 11 and 14. The work is being done by C. V. Holmberg under the direction of E. C. Jahn at the New York State College of Forestry, Syracuse, N. Y.

19. To the fundamental research committee, the sum of $650 in 1940 to assist in a cooperative project involving a study of different types of oxidized cellulose. The work is being carried out by a graduate student, under the supervision of Clifford B. Purves, at the Massachusetts Institute of Technology, Cambridge, Mass.

20. To the materials of construction committee, the sum of $800 in 1941 to (1) conduct an investigation of packing problems in the sulphate pulp industry, and (2) make a survey of the experience of sulphate pulp mills with materials used for process piping tubing. The investigation will be made under the direction of James A. Lee, Chairman of the above committee.

Personnel of Committee

The personnel of the research appropriations committee at present is as follows: John L. Parsons, Hammermill Paper Company, Erie, Pa., chairman; G. Lamont Bidwell, Jr., Riegel Paper Corporation, Milford, N. J.; James d'A. Clark, Institute of Paper Chemistry, Appleton, Wis.; Hugo H. Hanson, W. C. Hamilton & Sons, Miquon, Pa.; R. A. Hayward, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.; W. G. MacNaughton, News Print Service Bureau, New York, N. Y.; D. W. M'Cready, University of Michigan, Ann Arbor, Mich.; S. D. Wells, Institute of Paper Chemistry, and A. W. Nicherson, Consulting Engineer, New York, N. Y.

Technical Association Papers

The principal publication of the association is *Technical Association Papers*. As in other organizations the association found that printing and publishing are expensive items but are vital to the service to members who have grouped themselves together to exchange and obtain needed information to aid them in their responsibilities to their employers.

When the association was started it received the wholehearted support of the weekly magazine *Paper*, of which Thomas J. Keenan, the first secretary-treasurer was editor. In this way the association was kept free from publishing expenses to an important degree.

In 1918 the association began to publish its meeting papers and proceedings. This was a 68-page, paper-bound volume called *Technical Association Papers*. Since that time this publication has been issued annually until in 1940 and 1941 it has reached 752 pages. Since 1935 it has been substantially bound in cloth and is sent to members in all parts of the world.

In addition to publishing its articles in *Technical Association Papers* the association continued to contribute articles and items to the various trade papers. *Paper* continued to be the official organ until September, 1921, when PAPER TRADE JOURNAL was

selected and became the official organ of the association. The arrangement made was completely satisfactory and is still in operation.

Since the association was started it has published literally thousands of articles of real value to practical papermakers, engineers, chemists and executives of pulp and paper mills. It would require a great amount of space to list these publications in this issue. They are listed annually in the association's Year Book. However, the following are some typical examples of articles that have been published and issued to members:

Typical Papers

Low Pressure Steam in Paper Machine Drying
Paper Machine Felt Operation
Water Purification
Corrosion Resistance
Grease Resistance of Paper
Development of the Sulphite Process
Steam and Power Plant Location Factors
Air, Heat and Moisture Balance
Pumping Wood Pulp and Paper Stock
Heat Requirements for Drying Coated Paper
Power Factor and Means for Its Improvement
Determination of Alpha-Cellulose
Relation of Sheet Properties and Fiber Properties
Sulphur Burning Equipment for Sulphite Mills
Ink Resistance of Printing Papers
Handling and Drying of Single Coated Papers
Drying Paper on Yankee Driers
Variables in the Size Testing of Paperboards
Rate of Moisture Regain in Papers
Determination of Unbleached Sulphite
Deinking Waste Paper Stock
Sulphate of Alumina and the Alums
Research in the Use Requirements of Papers
Study of Bleaching of Kraft Pulp
Coordination of Technical Control and Mill Operation
Bleach Requirement of Pulp
Modern Lighting Practice in Paper Mills
Colloidal Control in Starch Sizing
Paper Machine Variables
Physical and Chemical Changes in Cooking New White Rags
Wood Pulp Fractionation
Permanganate Number of Pulps
Factors Influencing the Brightness of Paper
Use of Adhesives in Laminating Operations
Coloring Matter in Pine Kraft Pulps
Sheet Formation on the Fourdrinier Wire
Admission of Stock to the Fourdrinier Wire
Practical Limits of Steam Pressure and Temperature
Paper Machine Conversion Losses
Practical Aspects of Recent Kraft Mill Developments
Cure of Grainy Edges, Curl and Cockles in Paper
Optical Characteristics of Paper
Sulphite Mill Construction Materials
Liming of Digesters
Pulp and Paper Industrial Water Specifications
Printing with Rapid Drying Inks
Analysis of the Sulphite Acid Making Process
Heat Balance Calculation on Sulphate Recovery Process
Problem of Papermill Modernization
Trends in the Waste Paper Industry
Quality Control as Applied to a Paperboard Mill
Economic Factors of Refining
Beater Room Control
Alum, Its Use and Effect
Flocculation and Dispersion of Papermaking Fibers
Action of Sulphide in the Kraft Pulping Process
Consistency Regulators
Time-Temperature Control for Sulphite Digesters
Dimensional Changes in Paper
Retention of Fillers
Evaluation of Paper Coating Raw Materials
Public Relations in Industry
Evaluation of Pulpwood
Wood-Stone Contact Area
Colloidal Differentiation of Starch
The Mechanism of Softening Paper
Inks and Their Relation to Paper
Lubricating Papermaking Machinery
Job Evaluation
Interpretation of Flue Gas Analysis
The Roberts Grinder
Performance of Evaporators
Heat Transfer Characteristics of an Indirect-Heated Digester
Headbox and Slice Designs for Newsprint Machines

Each year finds *Technical Association Papers* adding to the factual wealth of the pulp and paper industry. The growth of wealth in the United States has been found to be directly proportional to the number of textbook titles and published articles that have accumulated. Ever since the nation was founded our material wealth increase has followed this trend of factual wealth and has never led it. Factual wealth has undoubtedly been a means for increasing material wealth.

Wide Scope of Articles Printed

In *Technical Association Papers* we find articles varying all the way from practical reviews of existing operations to reports on research work dealing with the industry's future operations. In many cases we find articles that were classed as highly theoretical when presented by the author but within a few years we find articles of a practical nature showing how former speculation has become routine detail, familiar to the workers in the mill.

The results produced by *Technical Association Papers* in the past have been of immeasurable value to the industry. It cleared the way for vocational education of the highest type. It reviewed the waste situation in the industry and showed how it could be minimized. It has focused attention on all the processes and equipment developments and has demonstrated the value of the technically trained man to the industry.

Textbooks Upon the Manufacture of Pulp and Paper*

On September 16, 1918, at Buffalo, N. Y., in a meeting of committees of the Technical Association of the Pulp and Paper Industry and the Technical Section of the Canadian Pulp and Paper Association, there was organized the Joint Vocational Education Committee of the Pulp and Paper Industry of North America, for the purpose of creating a set of textbooks which, in the language of the committee at that time, was to be:

"So prepared and arranged that each man may take the part of the course during his spare time that will be most helpful to him in the carrying on of his daily work in the mill and which will tell him in simple language the 'how and why' of operations which will result in the best quality of product."

On this basis, the Joint International Committee was organized, consisting of George Carruthers and T. L. Crossley representing the Canadian Section and George E. Williamson, C. P. Winslow and R. S. Kellogg representing the United States branch of the industry. This committee has remained intact to the present time, with the exception that after a year or two the place of C. P. Winslow was taken by R. S. Hatch. During the entire period, George Carruthers has been chairman and R. S. Kellogg secretary of the committee and J. N. Stephenson the editor of the textbooks.

The committee started with an idea but no money. In addition, therefore, to preparing the material for publication, it had the job of raising all the funds for necessary expenses. An outline of the contents of the proposed textbooks and a suggested program of instruction prepared by the committee was approved by the Canadian Pulp and Paper Association January 31, 1919, and by the American Paper and Pulp Association February 6, 1919, which became the basis for an appeal to the entire industry for financial and moral support.

The response of the industry was generous and continuous through five annual assessments by the Canadian Pulp and Paper Association, totaling $26,859, and individual contributions by 200 pulp and paper companies and manufacturers of mill equipment in the United States amounting to $30,176. This gave the committee a round sum slightly in excess of $57,000 for its initial work. A standard form of contract for publication of the books was entered into in due course with the McGraw-Hill Publishing Company with regular authors' royalties accruing to the committee. By specific resolutions of the United States and Canadian Associations the committee was authorized to hold the copyright to the books, receive the royalties and expend them for purposes of revision and promotion of education in the industry.

The royalties received to the end of this year will exceed $24,000. During the past 23 years the committee has expended some $77,000 for the preparation of the original five volumes of the textbooks, two revisions each of three volumes and for other educational activities. The committee still has over $6,000 in bank or safely invested as it has also had substantial interest accruals.

Throughout good times and bad interest in these books has never flagged. Sales in the first half of this year, for instance, have been 827 volumes and the total since first publication has exceeded 34,000 copies.

But mere figures of dollars and volumes by no means tell the story of this unique international undertaking which has been carried out in twenty-three years of effective and harmonious cooperation. More than one hundred men of technical qualifications in the industry have contributed to these books, either through the writing of sections therein, or the criticism of manuscript. The texts are recognized throughout the world as standard sources of information for students of the subjects treated.

This educational experiment was begun in the midst of World War I and is continuing through World War II because the executives of the North American pulp and paper industry believe that the workers therein who desire to do so should have opportunity to improve their understanding of the processes in which they participate. This viewpoint is summarized in the introduction to a circular upon the textbooks and the institutions which use them for instruction purposes sent early in 1940 to every paper mill in the United States and Canada:

"To All Pulp and Paper Makers:

"The Joint Textbook Committee has for twenty years provided the basis for a better education of those engaged in this industry.

"We realize that a course in drawing will not make an architect of a bricklayer if he has learned the principles of the arch and can read a blueprint.

"So with our industry, study alone will not make a superintendent or manager of a back tender or an acid maker. But we can have better pulp and paper makers and shall have better pulp and paper when all in the industry know the connection between steam pressure and temperature, lignin and cellulose, humidity and evaporation, surface tension and foaming, elastic limit and the life of wires and felts, etc.

"It is worth while for a workman to be a better pulp or paper maker; it is worth while for an executive to have better workmen; it is worth while for a man in any position to qualify himself for a better one. The following pages suggest some of the ways in which he may do so."

Now there is urgent call for trained men throughout all industry because such training was largely neglected during the prolonged depression. That charge doesn't lie against the pulp and paper industry of North America.

*Report prepared by R. S. Kellogg, Secretary, News Print Service Bureau, New York, N. Y. and Secretary of the Joint Textbook Committee of TAPPI and the C.P.P.A.

TAPPI Special Reports on Manufacturing Problems

The Technical Association of the Pulp and Paper Industry has always been essentially a clearing house on subjects relating to the operation, engineering and technology of pulp and paper manufacture.

In addition to the subjects discussed at meetings and the literature published every effort has been made to encourage members to present specific problems. Because of its broad membership the Association has resources of tremendous factual information.

To mobilize these resources the Association issued a bulletin in September 1921 in which it announced its Service to Members Plan. The first step in its effort to give improved service was the distribution of a questionnaire in which members were asked to indicate on a check sheet, subjects on which they had special knowledge. Every department of a mill was indicated, together with the equipment and unit operations used. In this way mailing lists were built up to enable the Association to present questions to those members who were best qualified to give information.

The first three reports were designated as x, y and z and were compiled by F. C. Clark and G. N. Collins who were the first members of the Service to Members Committee. These reports dealt with x. Relative Width of Felts and Press Rolls, y. Causes of High Sulphur Consumption in Sulphite Pulp Manufacture, and z. Substitute for Poplar for Soda Pulp. These were issued on June 27, July 10 and July 13, 1923. On February 29, 1924, Special Report No. 1 was issued. This was entitled Lime Formation in Sulphite Blowpits.

Beginning with Report No. 7 the compilation of responses was made by W. G. MacNaughton, Secretary-Treasurer and since that time all reports have been prepared by the Association's office staff.

From the beginning the identity of the respondents has been kept confidential and carefully in the locked files of the Association.

The reports when ready have been issued to those members who contributed information and to the corporate members of the Association. File copies have been kept available for use in the Association's offices and have been referred to by a large number of individuals. Many inquiries have been received which have been answered by supplying data from issued reports. More than three hundred reports have been distributed to date.

In addition to the information issued as Special Reports the Association has responded to hundreds of daily inquiries on many problems, most of which have been of a technical nature. The Special Reports have been based on inquiries that required data gathered from a number of companies or individuals.

Typical Special Reports

Following are the Special Reports issued to date:

X Relative Widths of Felts and Pressrolls
Y Causes of High Sulphur Consumption
Z Substitute for Poplar
1. Causes of Lime Precipitation in Blowpits
2. Meaning of Paper Tests
3. Calcium Carbonate and Rosin Sizing
4. How to Pile Groundwood
5. Washing Sulphite Pulp
6. Engine, Turbine or Motor for the Paper Machine
7. Fire Protection under the Paper Machine
8. Boxboard: Liner Separating from Filler
9. Felt Life and the Effect of Suction Boxes
10. Sizing and the Temperature of the Stock
11. Paper Drying and the Effect on Sizing Quality
12. Testing Kraft Pulp for Strength
13. Rifflers and the Dirt Problem in Chemical Pulp
14. Sulphur in Soda Pulp Cooking
15. Superheated Steam for Pulp Cooking
16. Black Liquor Evaporating Problem
17. Board Quality Problem
18. Paper and Sulphur Dioxide Content of Pulp
19. Tensile Tester for Boards
20. Cause and Prevention of Strings and Slugs
21. Barking Slabs
22. Water Resistant Folder Stock
23. Curling of Paper
24. Disposal of Broken Paper
25. Bonus Systems
26. Efficiency of a Jordan
27. Deterioration of Walls in Sulphate Mills
28. Corrosion of Evaporators for Black Liquor
29. Deterioration in Strength of Test Board
30. Pulp Board Problem
31. Paperboard Problem
32. Specifications for Index Bristol
33. Consistency Regulators
34. Black Ash Waste in Soda Pulp Mills
35. Sulphate Smelting Furnaces
36. Rope Stock and Bagging
37. Screening Bleached Pulp
38. Pitch Troubles in Sulphite
39. Effect of Residual Soda in Kraft Container Board
40. Asbestos Drier Felt Performance
41. Paper Machine Equipment and Operation
42. Slitter Accidents and How to Avoid Them
43. Steam Consumption for Drying Board
44. Specifications for Rope Paper for Sacks
45. Cooking Strawboard
46. Sulphite Waste Liquor
47. Rope Drives in Paper Mills
48. Sulphite Pulp for Greaseproof Paper
49. Salt Cake for Sulphate Mills

274. Management Methods Survey
275. Fuzz on Wire Side of Coating Stock
276. Hair Cuts from Wool on M. G. Waxing Sheet
277. Eliminating Fuzz in Mimeograph Paper
278. Sizing 100 Per Cent Rag Paper
279. Wetting Down Wood Piles
280. Casein Coated Paper for Offset
281. Requirements for Pulp and Paper Mill Water
282. Pulp and Paper Testing Progress
283. Power Data
284. Piling Pulp Wood
285. Increasing Cross Grain Textile Strength and Machine Direction Stretch
286. Maximum Temperature in Wooden Acid Storage Tanks (C-6)
287. Cymene from the Sulphite Process
288. Nip Pressures of Suction Press Rolls
289. Paper Mill Quality Control and Inspection
290. Sulphur Consumption in News Grade Sulphite Mills (C-7)
291. Scaly Material
292. Power Requirements in Roofing Felt Paper Mills
293. Indirect Heated Digester Survey
294. Rate of Drying Book and Other Printing Papers
295. Kraft Mill Odors and Their Control
296. Kraft Mill Odor Literature Survey
297. Influence of Calender Rolls on Patent Coated Board Finish
298. Survey of Paper Mill Water Requirements
299. Elimination of Pitch Troubles
300. Paper Formation on Cylinder Machines
301. Storage Chests Protective Coating
302. Drying Rates for Paperboard
303. Pulp Evaluation
304. Standard Humidity Conditions for Paper Testing
305. Coated Paper Splitting and Peeling in Printing
306. Opinions on 50 *vs* 65 Per Cent Relative Humidity for Testing
307. Relative Humidity Survey of A.P.P.A.
308. Recovery of Heat in Sulphite Pulp Mills
309. Starch Application to Paperboard for Gloss Ink Printing
310. Dust Collecting from Converting Machines
311. Variation in Beating Characteristics of Sulphite Pulp
312. Corrosion in Sulphate Pulp Mills
313. Use of Microscopy in Paper Mills
314. Drying Rates of Pulp
315. Color Matching Aptitude
316. Effect of Acidity on Paper

TAPPI Data Sheets

To assist engineers, superintendents and other technical men in their work the association issued a loose-leaf binder to all members in 1940. This binder contained compilations of specific information on the subjects mentioned in the list of data sheets.

The association is indebted to the engineering committee of the Canadian Pulp and Paper Association for many of the sheets since that organization began issuing these sheets some time prior to the Technical Association. At the present time and in the future the two organizations will cooperate in gathering valuable data, not found in the readily available engineering handbooks. In time it is possible that this information will be reclassified and issued as a pulp and papermill engineers handbook.

Since the type of material desired for these sheets is to some extent the result of mill tests the Association's staff would appreciate it if members will contribute appropriate data to be included in this series. Each data sheet is given a number and in many cases there are several sheets having the same number but with a special letter designation added. As more information is obtained on any subject already covered sheets with new letter designations will be added.

Following are some of the data sheets already issued:

1. Capacity of Showers
2. Hardness Scale Comparative Table
3. Head of Stock Behind Slice
4. Centrifugal Pump Characteristics
5. Paper Machine Production Chart
6. Flow Determination by Chemical Method
7. Temperature Chart for Metals
8. Wood Screws
9. Critical Speed of Roll
10. Barometric Leg Sizes
11. Pipe Templet Layout Tables and Data
12. Rolled and Forged Steel Recommendations
13. Carbon Steel S. A. E. 1020 Water Quenched
14. Carbon Steel S. A. E. 1040 Oil Quenched
15. Nickel-Chromium S. A. E. 3155 Oil Quenched
16. Chemical Composition of S. A. E. Steels
17. Chemical Composition of S. A. E. Steels
18. Alum Concentration
19. Vapor Pressure of Sulphur Dioxide Solutions
20. Freeness Scale Interconversion
21. Groundwood Friction Loss in Pipes
22. Sulphite Friction Loss in Pipes
23. Friction Loss in Elbows and Tees
24. Valve and Fitting Resistance to Flow
25. Evaporation of Water in Driers
26. Compressed Air Power Loss
27. Baume Relation to Specific Gravity
28. Sulphite Waste Liquor Concentration
29. Sulphite Waste Liquor Viscosity
30. Screening Efficiency Formulas
31. Castor Oil Temperature-Viscosity Corrections
32. Board Feet of Lumber
33. Digester Capacity Tables
34. Groundwood Quality
35. Canadian Standard Freeness Table
36. Heat Loss from Steam Pipes
37. Coal and B.t.u. Chart

46. Sampler for Sewer
47. Analyses of Ash from Paper
48. Properties of Aqua Ammonia
49. Available Chlorine in Bleach Liquor
50. Airdry Stock Volume and Consistency
51. Steam Turbine Characteristics
52. Total Heat Entropy Applied to Turbines
53. Sodium Hydroxide Density-Concentration
54. Rubber Belt Horsepower Correction Factors
55. Rubber Belt Horsepower Rating
56. Temperature Conversion
57. Identification of Metals and Alloys
58. Density and Soda Content of Black Liquor
59. Evaporation Factors
60. Air Volumes in Vacuum
61. Density of Milk of Lime Solution (Lenart)
62. Water Friction Loss in Pipe
63. Friction Loss in Wood Stave Pipe
64. Discharge of Nozzles and Weirs
65. Reflectance, Reflectivity and Opacity
66. Water Treatment Factors
67. Fuel Oil Colorific Values
68. Structural Steel Beam Loading
69. Reciprocating Pump Displacement
70. Amperes per Terminal for Motors
71. Flow Measuring Methods
72. Conversion Factors

The TAPPI Committees

From the beginning the real work of the Technical Association has been carried on by its standing committees. The detailed history of the accomplishments of these groups is recorded in the proceedings published in *Technical Association Papers.* In fact, the tremendous number of meeting papers published in these volumes as well as in the various trade papers were the result of the prodigious efforts of the committees and particularly of their chairmen. Space will not permit a detailed report of the histories of these committees in this issue and only the current activities will be indicated; however, the reports of the successive presidential administrations will reveal a few of the high lights of their past accomplishments.

The development of the committee organization has been one of normal growth. As the need has arisen committees have been organized and their objectives specified. The present organization represents the refinement of a program brought to a systematic arrangement during the presidential administration of Max. A. Krimmel of the Hammermill Paper Company in 1930. Prior to 1930 all the committees existed as independent units. In 1930 Mr. Krimmel offered a plan whereby committees having a general common interest were grouped into divisions, each having a general chairman to serve in an administrative capacity. This system has worked out very successfully and has simplified the administration of committee activities to a great extent.

In general the committees have the following responsibilities: 1. to maintain a competent personnel; 2. to determine suitable projects on which to focus attention; 3. to assist in the preparation of special reports on manufacturing problems; 4. to assist in the preparation of data sheets; 5. to establish standard testing methods, specifications, recommended practices and suggested methods; 6. to prepare monographs on technical subjects; 7. to prepare programs for annual and fall meetings; and 8. to assist the headquarters staff in responding to technical inquiries.

There are at present seven major committee divisions, namely, Engineering, Industrial, Pulp Manufacture, Paper Manufacture, Research Development, Converting and Consuming, and Testing. The current personnel and projects of these divisions and their committees will be reported briefly with the assistance of the committee chairmen.

Division and Committee Personnel

Since the work of the committees represents the aggressive effort of the chairmen and their committeemen it will be of interest to note the names of those who have led this work since 1915.

Although the divisional organization was not started until 1930 and consequently there were no divisional general chairmen before that time, we will include the chairmen of the independent committees under the classification that they would appropriately fall.

MANAGEMENT OR INDUSTRIAL DIVISION CHAIRMEN

1930 P. H. Glatfelter, P. H. Glatfelter Company.
1931-32 W. R. Maull, Dill and Collins, Inc.
1933-36 W. M. Shoemaker, National Vulcanized Fibre Company.
1937-38 B. M. Thomas, Container Corporation of America.

Note: The name of this division was changed from Management to Industrial in 1938.

1939 Harvey P. Cannon, Container Corporation of America.
1940-1941 Hugo H. Hanson, W. C. Hamilton and Sons.

ENGINEERING DIVISION

1930 John F. Rhoades, Mead Corporation.
1931 W. G. MacNaughton, News Print Service Bureau.
1932 E. F. Bearce, Chillicothe Paper Company.
1933-36 M. H. Teaze, Hardy S. Ferguson, Inc.
1937-41 W. G. MacNaughton, News Print Service Bureau.

OPERATING DIVISION

1930-37 Frederic C. Clark, consulting engineer.

Note: In 1938 this division was divided into a Pulp Manufacture Division and a Paper Manufacture Division.

PULP MANUFACTURE DIVISION

1938 W. F. Gillespie, Bogalusa Paper Company.
1939 Vance P. Edwardes, International Paper Company.
1940-41 S. D. Wells, Institute of Paper Chemistry.

PAPER MANUFACTURE DIVISION

1938-41 G. Lamont Bidwell, Jr., Riegel Paper Corporation.

TESTING DIVISION

1930-32 E. O. Reed, Crane and Company.
1933-35 R. C. Griffin, Arthur D. Little, Inc.
1936-38 Howard W. Morgan, Institute of Paper Chemistry.
1939-41 James d'A Clark, Institute of Paper Chemistry.

RESEARCH DEVELOPMENT DIVISION

1930-40 Carlton E. Curran, U. S. Forest Products Laboratory.
1941 Donald W. McCready, University of Michigan.

CONVERTING AND CONSUMING DIVISION

1930-41 Arno W. Nickerson, consulting engineer.

RAW MATERIALS DIVISION

1930-34 John L. Parsons, Hammermill Paper Company.
1935-37 John Traquair, Mead Corporation.

Note: This division was abolished in 1938 and its committees were assigned to the Industrial Division.

Industrial Division

VOCATIONAL TRAINING COMMITTEE

1917 Ernst Mahler, Kimberly-Clark Corporation.
1918-20 George E. Williamson, Strathmore Paper Company.
1921 Raymond S. Hatch, Hamersley Manufacturing Company.
1922 Frederic C. Clark, U. S. Bureau of Standards.
1923 Raymond S. Hatch, Hamersley Manufacturing Company.
1924 George E. Williamson, Strathmore Paper Company.
1925-26 Martin L. Griffin, Mt. Hope Finishing Company.
1927-28 Allen Abrams, Marathon Paper Mills Company.
1929-37 Harold G. Noyes, Oxford Paper Company.
1941 Wilbur L. Cassiday, Michigan Department of Vocational Education.

Note: This committee was called the Vocational Education Committee from 1917 to 1924, Training in the Industry Committee from 1925 to 1926, Training Committee from 1927 to 1929, Education from 1930 to 1934 and Personnel Management Committee from 1935 to 1937. It was discontinued in 1938 and reorganized as the Vocational Training Committee in 1941.

WAR SERVICE COMMITTEE

1918 Harry P. Carruth, American Writing Paper Company.

PULPWOOD PURCHASE SPECIFICATIONS COMMITTEE

1916 Hugh P. Baker, New York State College of Forestry.
1917 Carlisle P. Winslow, U. S. Forest Products Laboratory.

MECHANICAL HANDLING OF MATERIALS COMMITTEE

1927-28 George D. Bearce, News Print Service Bureau.

WASTE IN THE INDUSTRY COMMITTEE

1922-24 Robert B. Wolf, R. B. Wolf Company.
1925-26 George D. Bearce, News Print Service Bureau.

CORROSION AND WASTE PROBLEMS COMMITTEE

1928-29 Herman L. Joachim, Central Paper Company.

WASTE COMMITTEE

1930-37 Clarence M. Baker, consulting engineer.
1938-39 L. K. Burnett, Gair Cartons, Inc.

MANAGEMENT METHODS COMMITTEE

1930-31 L. C. Reynolds, American Writing Paper Company.
1932 W. M. Shoemaker, National Vulcanized Fibre Company.
1933 Herman L. Joachim, Container Corporation of America.
1934 Hugo H. Hanson, W. C. Hamilton and Sons.

PRODUCTION MANAGEMENT COMMITTEE

1935-37 Louis T. Stevenson, L. T. Stevenson Company.

INDUSTRIAL ENGINEERING COMMITTEE

1938-40 Louis T. Stevenson, L. T. Stevenson Company.
1941 J. Ronald Atwater, Dill & Collins, Inc.

Note: The last three mentioned committees were the same committee. The names and scope of these committees were changed somewhat.

FIBROUS RAW MATERIALS COMMITTEE

1930 Jessie E. Minor, New England Laboratories.
1931-34 John Traquair, Mead Corporation.
1935 Helen U. Kiely, American Writing Paper Company.
1936-39 Charles W. Boyce, American Paper and Pulp Association.
1940-41 John Traquair, Mead Corporation.

Note: This committee and the Nonfibrous Raw Materials Committee were transferred from the Raw Materials Division to the Industrial Division in 1938.

NONFIBROUS RAW MATERIALS COMMITTEE

1930-32 Arthur C. Dreshfield, Paper Makers Chemical Corporation.
1933-34 C. E. Peterson, Riegel Paper Corporation.
1935-36 James A. Lee, Chemical and Metallurgical Engineering.
1937 C. S. Taylor, Riegel Paper Corporation.
1938-39 Hugo H. Hanson, W. C. Hamilton and Sons.
1940-41 E. N. Poor, W. C. Hamilton and Sons.

Engineering Division

HEAT AND POWER COMMITTEE

1918-19 E. P. Gleason, Nekoosa-Edwards Paper Company.

1920-22 Howard S. Taylor, Management, Engineering and Development Company.
1923-24 W. W. Cronkhite, General Electric Company.
1925-26 R. W. Leeper, H. S. Taylor Company.
1927 E. F. Troop, P. H. Glatfelter Company.
1928-29 John F. Rhoades, Mead Corporation.
1930 John D. Rue, News Print Service Bureau.
1931-32 M. H. Teaze, Hardy S. Ferguson Company.
1933-36 A. G. Darling, General Electric Company.
1937-39 A. E. Montgomery, J. O. Ross Engineering Company.
1940-41 Roderick O'Donoghue, consulting engineer.

MATERIALS OF CONSTRUCTION COMMITTEE

1930-36 James D. Miller, York Haven Paper Company.
1937-41 James A. Lee, Chemical and Metallurgical Engineering.

EQUIPMENT COMMITTEE

1930 G. S. Brazeau, Appleton Machine Company.
1931 E. F. Bearce, Chillicothe Paper Company.
1932-36 Frederick Wierk, Johnson & Wierk.
1937 F. P. Wilmer, Albemarle Paper Company.

WATER COMMITTEE

1938 L. M. Booth, Booth Chemical Company.
1939-41 Lewis B. Miller, Keasbey & Mattison Company.

Operating Division

Note: In 1938 this division was divided into a Pulp Manufacture Division and a Paper Manufacture Division and will be so treated for this summary.

Pulp Manufacture Division

SULPHITE COMMITTEE

1916-18 Robert B. Wolf, Burgess Sulphite Fibre Company.
1919 Herbert G. Spear, Brown Company.
1920-21 W. E. Byron Baker, York Haven Paper Company.
1922-23 Ralph A. Hayward, Newton Falls Paper Company.
1924-25 Bertram S. Summers, consulting engineer.
1926-27 Gosta P. Genberg, Fraser Companies, Ltd.
1928-29 R. N. Miller, Champion Fibre Company.

ACID PULPING COMMITTEE

1930-31 L. E. Jonte, Hoberg Paper and Fibre Company.
1932-33 Vance P. Edwards, International Paper Company.
1934 P. A. Paulson, Kimberly-Clark Corporation.
1935 W. H. Swanson, Kimberly-Clark Corporation.
1936-37 Vance P. Edwardes, International Paper Company.
1938 R. N. Miller, Oxford Paper Company.
1939-41 Horace A. Du Bois, Kimberly-Clark Corporation.

SODA PULP COMMITTEE

1916-19 Martin L. Griffin, Oxford Paper Company.
1920-24 George K. Spence, New York and Pennsylvania Company.
1925-27 W. S. McClellan, P. H. Glatfelter Company.
1928 J. E. Plumstead, Jessup & Moore Paper Company.

SULPHATE PULP COMMITTEE

1917 Otto Kress, Forest Products Laboratory.
1918-19 Olai Bache-Wiig, Wausau Sulphate Fibre Company.
1920-21 Carl Moe, Minnesota and Ontario Paper Company.
1922-23 G. F. Enderlein, Nekoosa-Edwards Paper Company.
1924 O. S. Egan, Nekoosa-Edwards Paper Company.
1925 R. M. Radsch, Thilmany Pulp and Paper Company.
1926 R. H. Stevens, Bogalusa Paper Company.
1927-28 Clinton K. Textor, Northwest Paper Company.

ALKALINE PULPING COMMITTEE

1929-31 Elmer S. Hinman, P. H. Glatfelter Company.
1932-37 Harold R. Murdock, Champion Paper and Fibre Company.
1938-41 Paul Hodges, Brunswick Pulp and Paper Company.

GROUNDWOOD COMMITTEE

1916 D. L. Bellinger, Finch, Pruyn Company.
1917 George C. McNaughton, Forest Products Laboratory.
1918 J. O. Mason, Laurentide Pulp and Paper Company.
1919 W. A. Kelly, Marathon Paper Mills Company.
1920-23 W. A. Munro, Minnesota and Ontario Paper Company.
1924-25 Worthen E. Brawn, Pejepscot Paper Company.
1926 C. K. Andrews, Itasco Paper Company.
1927 S. C. Brayton, Itasco Paper Company.

MECHANICAL PULPING COMMITTEE

1928 Worthen E. Brawn, Pejepscot Paper Company.
1929 Edwin A. Riley, Pejepscot Paper Company.
1930-31 Joseph H. Slater, Escanaba Paper Company.
1932-33 W. J. Garding, Watab Paper Company.
1934-35 M. P. Chaplin, Keyes Fibre Company.
1936-38 R. I. Wynne-Roberts, Norton Company.
1939-40 Lyman Beeman, St. Regis Paper Company.
1941 Robert F. Huntley, Sealright Company.

PULP PURIFICATION COMMITTEE

1938-39 Charles Carpenter, Herty Foundation Laboratory.

1940-41 D. T. Jackson, Hammermill Paper Company.

Paper Manufacture Division

PREPARATION OF FIBROUS MATERIALS COMMITTEE

1930 F. Hayward Johnson, Cherry River Paper Company.
1931 Charles A. Blodgett, Eastern Manufacturing Company.
1932-33 C. J. Christiansen, Fibre Making Processes, Inc.
1934 Fred W. Motschman, Continental Paper and Bag Mills.
1935 George D. Bearce, International Paper Company.
1936-37 Sidney D. Wells, consulting engineer.

PREPARATION OF NONFIBROUS MATERIALS COMMITTEE

1931-32 Karl A. Taylor, Oxford Paper Company.
1933-38 Helmuth C. Schwalbe, Dill and Collins, Inc.
1939-41 C. Maurice Connor, Valley Forge Laboratories.

BEATER FURNISH COMMITTEE

1920-21 J. C. Sanborn, Strathmore Paper Company.

STUFF PREPARATION COMMITTEE

1927-29 George K. Spence, New York and Pennsylvania Company.
1930-31 E. G. Ham, John A. Manning Paper Company.
1932 James Coghill, Noble and Wood Machine Company.
1933-34 D. Manson Sutherland, Jr., Consulting Engineer.
1935-37 G. Lamont Bidwell, Jr., Riegel Paper Corporation.
1938-41 Ward D. Harrison, Ecusta Paper Company.

ROOFING FELT AND PAPERBOARD COMMITTEE

1927-28 P. W. Codwise, Beaver Products Company.
1929 Clark C. Heritage, Forest Products Laboratory.

FINE AND SPECIAL PAPERS COMMITTEE

1928 T. C. Bentzen, Whiting-Plover Paper Company.
1929 Jessie E. Minor, New England Laboratories.

FELTS COMMITTEE (Jointly with the Felt Manufacturers Council)

1922-23 George H. Harvey, Gardner-Harvey Company.

WIRES COMMITTEE (Jointly with Wire Manufacturers Association)

1922-23 E. C. Spear, Cheney-Bigelow Wire Works.

PAPER DRYING COMMITTEE

1923 Samuel B. Jones, Pejepscot Paper Company.
1924-25 W. N. Baker, International Paper Company.

PAPER MANUFACTURE COMMITTEE

1930-31 Leon M. Yoerg, American Writing Paper Company.
1932 Lyman M. Smith, Cherry River Paper Company.
1933-35 Frank C. Ladd, Keith Paper Company.
1936-37 George D. Bearce, Main Seaboard Paper Company.

FORMING AND FINISHING COMMITTEE

1938 Everett P. Ingalls, S. D. Warren Company.
1939-41 Albert E. Bachmann, Missisquoi Corporation.

FINISHING COMMITTEE

1932-33 Herman R. Harrigan, District of Columbia Paper Company.
1934 L. Werdern, Penisular Paper Company.
1935-36 Vincent F. Waters, Wrenn Paper Company.
1937 A. B. Clark, Racquett River Paper Company.

Note: In 1938 the Paper Manufacture and Finishing Committees were combined into the Forming and Finishing Committee.

Research Development Division

ABSTRACTS COMMITTEE

1916 J. Newell Stephenson, University of Maine.
1917 John D. Rue, University of Michigan.
1918-22 Ross Campbell, American Writing Paper Company.

BIBLIOGRAPHY COMMITTEE

1916-19 Henry E. Surface, Forest Products Laboratory.
1920-22 Clarence J. West, National Research Council.

ABSTRACTS AND BIBLIOGRAPHY COMMITTEE

1922-41 Clarence J. West, Institute of Paper Chemistry.

Converting and Consuming Division

COATED AND PROCESSED PAPERS COMMITTEE

1920-21 Clarke Marion, Champion Coated Paper Company.
1922-24 Edwin Sutermeister, S. D. Warren Company.
1925-27 Donald V. Lowe, Lowe Paper Company.

FINISHING, PROCESSING AND CONVERTING COMMITTEE

1930 Norman Clark, Standard Paper Manufacturing Company.

COATING COMMITTEE

1931-37 James J. O'Connor, Mead Corporation.
1938-40 Frank W. Egan, John Waldron Corporation.
1941 J. D. Davis, Dill and Collins, Inc.

Note: The Coating Committee replaced the Finishing, Processing and Converting Committee in 1932.

LAMINATING COMMITTEE

1932 E. C. Lathrop, Celotex Company.
1933-35 Harvey P. Cannon, Container Corporation of America.

CONTAINER COMMITTEE

1932 H. R. Koch, Auglaize Boxboard Company.
1933-36 Pierre Drewsen, Hinde & Dauch Paper Company.
1937-41 J. D. Malcolmson, Robert Gair Company.

PAPER BAG COMMITTEE

1936-38 R. M. Bates, Thomas M. Royal Company.

GRAPHIC ARTS COMMITTEE

1932-37 Charles Clarkson, International Printing Ink Company.
1938-39 John F. Halliday, Container Corporation of America.
1940-41 Morris S. Kantrowitz, The Government Printing Office.

Testing Division

WOOD TESTING

1930 W. H. Monsson, Munising Paper Company.

FIBROUS MATERIALS TESTING

1931 W. H. Monsson, Munising Paper Company.
1932-36 M. A. Youtz, Northern Paper Mills.
1937-40 C. E. Hrubesky, Forest Products Laboratory.
1941 B. E. Lauer, North Carolina State College.

PULP TESTING FOR MOISTURE COMMITTEE

1921-24 E. C. Tucker, Chemical Paper Manufacturing Company.

PHYSICAL STANDARDS FOR PULP COMMITTEE

1928 Henry A. Rothchild, Kimberly-Clark Corporation.
1929 Donald E. Cable, Oxford Paper Company.

PULP TESTING COMMITTEE

1930-32 Donald E. Cable, Oxford Paper Company.
1933-35 Howard W. Morgan, New York State College of Forestry.
1936 W. O. Hisey, New York State College of Forestry.
1937 J. E. Spaulding, Oxford Paper Company.
1938-39 F. W. Brainerd, Scott Paper Company.
1940-41 W. O. Hisey, New York State College of Forestry.

PAPER TESTING

1916 Harry P. Carruth, American Writing Paper Company.
1917-21 Frederic C. Clark, American Writing Paper Company.
1922-24 Fred A. Curtis, U. S. Bureau of Standards.
1925-41 B. W. Scribner, National Bureau of Standards.

DYESTUFFS TESTING COMMITTEE

1916 Otto Schutz, Badische Company.
1917 Evar Refsaas, Falls Manufacturing Company.
1920 Otto Kress, Forest Products Laboratory.
1921-22 Ross Campbell, American Writing Paper Company.
1923 Norman Clark, Holyoke Paper Products Company.
1924 Kenneth T. King, E. I. du Pont de Nemours.
1925 Carl C. Schneider, Hawthorne Paper Company.

COLOR COMMITTEE

1934-36 John L. Parsons, Hammermill Paper Company.

OPTICAL PROPERTIES COMMITTEE

1937-39 John L. Parsons, Hammermill Paper Company.
1940-41 M. N. Davis, Kimberly-Clark Corporation.

MICROSCOPY COMMITTEE

1940-41 Fred W. Bentzen, Kimberly-Clark Corporation.

CHEMICAL METHODS COORDINATING COMMITTEE

1941 B. L. Browning, Institute of Paper Chemistry.

MATERIALS TESTING COMMITTEE

1916 Max Cline, International Paper Company.
1917 Raymond S. Hatch, Crocker-McElwain Company.
1918-19 Hans Gesell, Hammerschlag Manufacturing Company.
1920 E. C. Tucker, Chemical Paper Manufacturing Company.
1921-22 N. Folke Becker, Westfield River Paper Company.
1923-24 Helen U. Kiely, American Writing Paper Company.
1925-27 Max A. Krimmel, Hammermill Paper Company.
1928 Jessie E. Minor, New England Laboratories.
1929 F. C. Peterson, New York State College of Forestry.
1930-31 Roger C. Griffin, Arthur D. Little, Inc.

NONFIBROUS MATERIALS TESTING COMMITTEE

1932 Roger C. Griffin, Arthur D. Little, Inc.
1933-34 W. A. Chapman, Skinner and Sherman, Inc.
1935-38 Clifford E. Peterson, Riegel Paper Corporation.
1939-40 William A. Kirkpatrick, Allied Paper Mills.
1941 W. F. Hathaway, Kalamazoo Vegetable Parchment Company.

Although not a part of the Testing Division the following committees are listed herein since a large part of its work has dealt with the establishment of testing procedures.

STANDARD TESTING METHODS COMMITTEE

1926-29 Max A. Krimmel, Hammermill Paper Company.
1929-41 Roger C. Griffin, Arthur D. Little, Inc.

Committee Projects and Personnel

An important phase of the committee activities is what is known as committee projects. These are special objectives worked on by the committees and

usually culminate in a meeting paper or special report. Only the current projects will be listed. To date the committees have worked on more than two hundred projects.

Engineering Division

HEAT AND POWER COMMITTEE

No. 1. Drying Rates for Paper
4. Heat Utilization in Cooking Alkaline Pulp
5. Heat Utilization in Evaporating Bleach Liquor
66. Variation of Drying Rates of Individual Driers Through the Drier Section
116. Standard Practice for Determining Drying Rates
117. Monograph on Drying Rates
147. Heat Losses in Sulphite Pulping
168. Digester Blow Heat Recovery
170. Insulation of Digesters
174. Study of Fuels and Their Applications

The present chairman of the Heat and Power Committee is Roderick O'Donoghue, Consulting Engineer, New York City. All the work is carried on by three subcommittees as follows:

DRYING, HEATING AND VENTILATING SUBCOMMITTEE

A. E. Montgomery, Chairman, J. O. Ross Engineering Company
G. H. Dyer, Oxford Paper Company, Rumford, Maine
L. G. Green, A.P.W. Paper Company, Albany, N. Y.
J. H. Masshard, Scott Paper Company, Chester, Pa.

HEAT UTILIZATION IN CHEMICAL PROCESSES SUBCOMMITTEE

J. W. Ogden, Foster-Wheeler Corporation, New York, N. Y.
R. E. Chase, R. E. Chase Company, Tacoma, Wash.
T. L. Dunbar, Chemipulp Process, Inc., Montreal, Que.
T. R. Moore, Brown Paper Mill Company, Monroe, La.
M. B. Mount, Mount Chemical Equipment Company, Lynchburg, Va.
J. P. Rubush, Swenson Evaporator Company, Harvey, Ill.
W. H. Swanson, Kimberly-Clark Corporation, Neenah, Wis.
W. T. Webster, Brunswick Pulp and Paper Company, Brunswick, Ga.

PRODUCTION AND TRANSMISSION OF POWER SUBCOMMITTEE

E. F. Burns, International Paper Company, New York, N. Y.
R. R. Baker, Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa.
P. W. Foster, Foster-Wheeler Company, New York, N. Y.
Barry Turner, International Paper Company, Ticonderoga, N. Y.
G. R. Wadleigh, West Virginia Pulp and Paper Company, New York, N. Y.

The scope of the Heat and Power Committee is the generation, distribution and application of energy and the study of fuels.

MATERIALS OF CONSTRUCTION COMMITTEE

The personnel of this committee consists of:

James A. Lee, Chairman, Chemical and Metallurgical Engineering, New York, N. Y.
G. F. Alcorn, Weyerhaeuser Timber Company, Everett, Wash.
P. B. Corning, International Paper Company, Palmer, N. Y.
Paul Hodges, Florida Pulp and Paper Company, Pensacola, Fla.
S. B. Jones, West Virginia Pulp and Paper Company, Piedmont, W. Va.
F. L. LaQue, International Nickel Company, New York, N. Y.

The current projects are as follows:

No. 114. Survey of Piping and Tubing Materials
154. Survey of Packing Materials

These projects are being handled by two subcommittees:

PACKING MATERIALS SUBCOMMITTEE

J. W. Hemphill, Chairman, Johns-Manville Company, New York, N. Y.
F. H. Cole, Walworth Company, New York, N. Y.
F. J. Hill, Green, Tweed Company, New York, N. Y.
Paul Hodges, Florida Pulp and Paper Company, Pensacola, Florida
T. H. Ireland, Crane Company, Long Island City, N. Y.
M. M. Klosson, Buffalo Pumps, Inc., Buffalo, N. Y.
H. F. Schenk, William A. Hardy and Sons, Fitchburg, Mass.
B. F. Smith, Kimberly-Clark Corporation, Neenah, Wis.
K. E. Terry, S. D. Warren Company, Cumberland Mills, Maine
J. J. Thompson, Worthington Pump and Machinery Company, Harrison, N. J.
F. C. Thorne, Garlock Packing Company, Palmyra, N. Y.

PIPING AND TUBING MATERIALS SUBCOMMITTEE

S. B. Jones, Chairman, West Virginia Pulp and Paper Company, Piedmont, W. Va.
R. T. Barnes, International Nickel Company, New York, N. Y.
R. S. Burr, American Brass Company, Waterbury, Conn.
A. W. Brandt, Jr., American Rolling Mills Company, Middletown, Ohio
J. B. Fullman, A. M. Byers and Company, Pittsburgh, Pa.
F. L. LaQue, International Nickel Company, New York, N. Y.
A. J. Maahs, Johns-Manville Company, New York, N. Y.
C. H. McCollam, Timken Roller Bearing Company, Canton, Ohio

The scope of the Materials of Construction Committee includes the physical and chemical nature of materials entering into the construction and mainte-

nance of buildings and equipment, their economics, service tests and records.

The Materials of Construction Committee came into existence early in 1929 and shortly thereafter a survey was conducted to examine the practice in sulphite pulp mills relative to the ability of equipment materials to successfully combat the problem of corrosion. This survey resulted in an exchange of actual mill experience with the stainless steels and other alloys which were then so new that they were creating great interest among engineers.

In an effort to supplement the experimental work in progress in the sulphite pulp mills, this committee undertook with the cooperation of the metal companies an investigation of the corrosion-resistance of the newer ferrous and nonferrous alloys. Samples were placed in sulphite digesters at several mills. This work supplied additional information relative to the suitability of the new materials and led to the establishment of specifications for chrome-nickel-iron castings such as relief valves, strainers, pumps and digest fittings for use in sulphite processing.

Several years ago, with the greatly increased activity in the sulphate division of the industry, there developed a demand for information on the materials of construction of equipment for the kraft pulp mills then under construction. This shift in the industry gave the committee an opportunity to be of considerable service by supplying information to the builders of these new mills.

An extensive study was made covering practical experience with materials used for processing equipment in sulphate pulp mills, including the bleaching department. The knowledge was acquired by means of a questionnaire and a personal visit by the chairman to 25 mills in the South and Middle West which afforded an opportunity to discuss the corrosion and abrasion problems at first hand with the engineers who were responsible for selection and operation of the equipment.

This general survey brought to light the fact that one of the most troublesome problems in the sulphate pulp mills was the packing of pumps. The survey also showed that little is known about the many types of pipe there are on the market and in use in the mills at the present time. Therefore it was decided to appoint subcommittees which would concentrate their efforts on the studies of these two problems. It is hoped that the investigation of the packing problems will lead to the solution of the trouble now encountered in the mills by establishing specifications for packing for use in pumps or valves handling each of the many corrosive solutions or by supplying the packing manufacturers with more reliable information concerning the nature of the solutions to be handled and operating conditions. It is expected that a survey of experience with piping materials would result in more reliable and economical pipe and tubes for process operations.

During the current year, Vincent Waters of the association staff visited many of the mills in the South and Middle West to collect the necessary knowledge about present practices in regard to the nature of the corrosive liquids in operating conditions, for the benefit of the Packing Subcommittee, and information regarding experiences of the pulp mills with materials used for process piping and tubing for the committee working on that subject.

The Materials of Construction Committee also has been actively engaged in preparing contributions to the TAPPI Data Sheets. One of these covers the identification of the metals by rapid and simple means that can be used in the mill; another covers the instructions for packing of stuffing boxes; while we hope to have two more ready for publication shortly. They will deal with gasket and flange packing and lubrication of stuffing boxes.

The Committee also has identified itself with the work of the American Society for Testing Materials and has been able to assist with specifications covering the ferrous and nonferrous alloys.

Water Committee

The Water Committee's scope covers the physical and chemical properties of water for pulp and paper-mill use.

L. B. Miller, chairman, Keasbey & Mattison Company, Ambler, Pa.
C. M. Baker, consulting engineer, Madison, Wis.
C. M. Connor, Valley Forge Laboratories, W. Conshohocken, Pa.
L. E. McGrath, Booth Chemical Company, Elizabeth, N. J.
R. B. Martin, Wallace & Tiernan Company, Newark, N. J.
W. F. Mitchell, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.
J. G. Patrick, West Virginia Pulp and Paper Company, Luke, Md.
E. N. Poor, W. C. Hamilton and Sons, Miquon, Pa.
S. T. Powell, consulting engineer, Baltimore, Md.

Associated with this committe is a White Water Subcommittee:

C. M. Baker, chairman, Madison, Wis.
P. S. Billington, Weyerhaeuser Timber Company, Longview, Wash.
F. J. McCourt, International Paper Company, Palmer, N. Y.
R. B. Robertson, Jr., Champion Paper and Fibre Company, Hamilton, Ohio
R. J. Schadt, Crown-Zellerbach Corporation, San Francisco, Cal.
E. R. Schafer, Forest Products Laboratory, Madison, Wis.
H. J. Skinner, Skinner and Sherman, Boston, Mass.

In 1937 the Water Committee was organized under the Engineering Division to carry on activities on the various technical and economic aspects of water which had previously been distributed among other committees and divisions, including the Engineering and Industrial Divisions and the Nonfibrous Raw Materials and Waste Committees. Under the guidance of L. M. Booth, as chairman of the newly formed Water Committee, work on this subject was organized into several subdivisions and carried on enthusiastically. The work so auspiciously and ably begun under the guidance of its first chairman was

interrupted by the untimely death of Mr. Booth early in 1939. The work of the committee under the present chairman has continued along the lines indicated by the vision and careful thought of its first chairman.

The work of the committee falls logically into several subdivisions, each dealing with some phase of the general problem; work along the following phases is being carried on:

With a view to developing specifications for process water quality for pulp and paper manufacture, two questionnaires were sent out to the industry. These received an excellent response and from them a lengthy report, TAPPI Special Report 298 entitled "A Survey of Paper Mill Water Requirements" was prepared and a short resume published in the *Paper Trade Journal* and in *Technical Association Papers*. The information obtained was insufficient for the preparation of specifications for water quality for the manufacture of various grades of pulp and paper. Because of its importance, this problem now forms one of the major projects of the Water Committee.

Consideration of water analysis falls into several subdivisions:

Highly Accurate Methods of Chemical Analysis: In general for very accurate analyses it is customary to follow the standard procedures such as are found in such well recognized publications as the Standard Methods of the American Public Health Association and American Water Works Association, or the standards of the American Society for Testing Materials.

Because in many cases, as in the control of operations in pulp and paper manufacture, it is more important to have numerous fairly accurate analyses of water indicating variations and trends in mill operation, rather than a very few highly accurate analyses, the Water Committee is preparing and has almost completed a system of rapid procedures for the chemical analysis of water. These rapid procedures will in no way take the place of the standard methods for accurate work but are designed to fill a need not met by the slow, but accurate methods.

The methods for the measuring, sampling and analysis of white water originally prepared by the Waste Committee under its chairman, C. M. Baker, have been revised recently by the Water Committee and have been published in 1940 as a Tentative Standard.

Work on the Bacteriological Testing of Water is being done by a separate Association committee which deals with the bacteriological testing of paper products in general.

At the annual meeting each February the Water Committee sponsors a water program. During the past several years a major portion of each program has been given to papers dealing with methods of water treatment which have been found suitable in actual practice for the preparation of raw waters for use in pulp and paper mills.

A subcommittee of the Water Committee deals with problems on white water. The standard dealing with "Flow Measurement of White Waters" (E 2 p-40) recently revised. As noted previously, the methods dealing with the analysis of white waters has also been revised.

Perhaps the most ambitious project of the Water Committee was begun during the summer of 1940 on the preparation of a monograph on "Water for Industrial Purposes." During the last decade or so water chemistry and technology has become a highly specialized science capable of being competently handled only by specialists in this field. The books and publications on this subject have become equally specialized. There was an evident need therefore for a monograph written in a more simple style and dealing with the general aspects of water as related to pulp and paper mill operation. The project was approved by the TAPPI executive department and the needed funds provided. The monograph has been prepared through the efforts of the Water Committee and publication is anticipated during the fall of 1941. This volume has been written to acquaint the nontechnical operator and the mill executive, with the problems of water usage in the pulp and paper industry and with the science and economics of the solutions to some of these problems. In addition it is intended to serve as a general textbook on this subject to the operator in the pulp or paper mill.

The Water Committee has gone to considerable pains to prepare a thorough review and summary of recent progress in the field of water technology, with emphasis on progress made during 1940, in order to provide the pulp and paper industry with a digest and references on the best and most authoritative information on the various phases of water technology. It is hoped that this carefully prepared review (*Technical Association Papers*, June, 1941) may serve as a basic source of information on this subject for the industry and it is planned to provide short reviews at the end of each year in order to keep this information up to date.

Industrial Division

Industrial Engineering Committee

The scope of the Industrial Engineering Committee covers plant organization; production standards and control; storekeeping and control; quality control and inspection; production development and research; materials handling; storage facilities and requirements; application of steam and electric power and plant maintenance.

Following is the personnel for the current year:

J. Ronald Atwater, Chairman, Dill & Collins, Inc., Philadelphia, Pa.
Albert E. Bachmann, Missisquoi Corporation, Sheldon Springs, Vt.
George D. Bearce, Maine Seaboard Paper Company, Bucksport, Me.
John Cornell, Paper Mill News, New York, N. Y.
E. H. Clapp, Penobscot Chemical Fibre Company, Great Works, Me.
J. A. Fincken, A.P.W. Paper Company, Albany, N. Y.
Ronald W. Hynes, Newton Falls Paper Company, Newton Falls, N. Y.

Frank D. Libby, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.

V. L. Tipka, Hawley Pulp and Paper Company, Oregon City, Ore.

In 1938 a mill survey on "Quality Control and Inspection" met with an industry response equivalent to 37.8 per cent of United States capacity. The results of this survey are included in TAPPI Special Report 289.

The committee has to date confined its activities in both committee work and annual convention presentations to production standards and control and quality control and inspection with a view toward the establishment of standard procedures and practices.

The general objective of this committee is to widen the scope of the Association by including factors of operating elements immediately surrounding technical application and activity which is essential to ultimate success—i.e., industrial relations, cost fact and finding, application results of new equipment and methods and technological advancements.

Two inquiries are currently under consideration, Project No. 177 to cover raw materials handling to the mill and Project No. 199 on the application of steam and electric power in terms of production tonnage.

Nonfibrous Raw Materials Committee

Now that the pulp and paper industry has become the second largest consumer of chemicals in the United States, the Nonfibrous Raw Materials Committee has assumed considerable importance in its work of keeping the industry informed regarding the sources, procurement, transportation, storage, economics and specifications of nonfibrous raw materials.

The committee personnel is comprised of twenty representatives from various chemical companies. A report is prepared annually by this group and published in *Technical Association Papers* as contributions to Project No. 146. The Committee is working on another project No. 176 on a study of the trends in consumption of nonfibrous materials.

The present personnel of the committee is as follows:

Chairman .....E. N. Poor, W. C. Hamilton & Sons, Miquon, Pa.
Size .....J. C. Dieffenderfer, Hercules Powder Company, Wilmington, Del.
Rosin .....A. E. Griffin, American Cyanamid and Chemical Company
Oils .....J. H. Fritz, National Oil Products Company, Harrison, N. J.
Starch .....John Goldstein, Stein, Hall Company, New York, N. Y.
Starch .....H. Harden, Corn Products Refining Company, New York, N. Y.
Clays .....R. E. Harter, R. T. Vanderbilt Company, New York, N. Y.
Alum .....N. J. Heffernan, Monsanto Chemical Company, New York, N. Y.
Alkalies .....S. W. Jacobs, Niagara Alkali Company, New York, N. Y.
Waxes .....R. W. Kumler, American Cyanamid and Chemical Company, New York, N. Y.
Plasticizers .....J. F. Leete, Chicago, Ill.
Sulphur .....D. B. Mason, Freeport Sulphur Company, New York, N. Y.
Salt Cake .....M. H. McAllister, F. W. Berks Company, New York, N. Y.
Silicates .....R. Morehouse, Philadelphia Quartz Company, Philadelphia, Pa.
Plasticizers .....Nathan R. Pike, Nulomoline Company, New York, N. Y.
Alkalies .....R. J. Quinn, Mathieson Alkali Company, New York, N. Y.
Dyes .....C. F. Schauman, E. I. du Pont de Nemours, Wilmington, Del.
Synthetic Resins .J. J. Thomas, Rohm and Haas Company, Philadelphia, Pa.
Glue .....R. Tutt, Peter Cooper Glue Company, Philadelphia, Pa.
Chlorine .....N. C. Weil, Solvay Process Company, New York, N. Y.
Titanium .....W. R. Willets, Titanium Pigment Company, New York, N. Y.

Fibrous Raw Materials Committee

John Traquair, chairman of this committee, reports as follows:

"The Fibrous Raw Materials Committee has to deal with 'the sources, procurement, transportation, storage, economics and specifications of fibrous raw materials such as wood, wood pulp, rags, old papers and straw.'

"This committee has continuously kept in touch with the progress and raw material requirements of the paper industry. In the 1920's considerable development took place both here and abroad in pulp processes designed to use the excess chlorine production from plants erected during World War I. These processes were generally applied to agricultural wastes, mainly straw, and the manufacture of bleached straw pulp was in operation in a modern plant in 1930. This development was followed by the Raw Materials Committee and several reports and other papers were published in the early 1930's.

"The depression, however, proved that these developments were economically unsound; however, agricultural wastes remain our largest potential source of cellulose and the new federal laboratory at Peoria is undertaking the investigation of this problem.

"Wood is still our basic fibrous raw material and the Committee has reported on and discussed and arranged for papers dealing with the greater utilization of new and additional wood species due to the application of technical knowledge to pulping processes—an example being an expansion of the semi-chemical process developed during the late 1920's and there is and has been for several years five mills in operation converting waste extracted chestnut chips, employing over 100 men and producing 150,000 tons of various paperboard products annually.

"The competition of other industries for the basic raw material of the paper industry comes not only

from the rayon textile and similar industries where only high grade cellulose is used, but in an increasing extent from the insulating and building board industry where huge quantities of pulpwood are annually converted. These developments are being watched and reported upon as occasion permits, because their effect on raw material supply is of major importance.

"There are of course numerous secondary raw materials such as rags—old and new, raw cotton and linters, old rope and bagging, flax waste, etc.—which are important to specialty mills and are frequently dealt with in papers and reports.

"The deinking and utilization of waste paper has received a great deal of attention in recent years. Many new processes involving both chemicals and equipment used have been proposed and installed. In the present emergency, a largely increased use of waste paper is easily foreseen. At present the paperboard industry uses nearly 5,000,000 tons of waste paper, but there is a large potential reserve. Waste paper becomes increasingly available as its value increases.

"Owing to the lack of our usual European pulp supplies and paper production at an all time high, shortages are becoming more acute and the industry will be called upon to use all its ingenuity and technical skill to substitute recovered pulp in regular grades and utilize every surplus available.

"Naturally when manufacturers become anxious regarding their raw material supplies it is 'open season' for propositions of all kinds on new sources of cellulose.

"The committee through its members is endeavoring to collect all the information available on these new projects both from the technical and economic point of view and believe that we can render the industry a real service by having them discussed in open sessions."

The personnel of the committee is as follows:

John Traquair, chairman, Mead Corporation, Chillicothe, Ohio
George D. Bearce, Maine Seaboard Paper Company, Bucksport, Me.
Charles W. Boyce, U. S. Office of Production Management, Washington, D. C.
E. G. Ham, John A. Manning Paper Company, Troy, N. Y.
Paul Hodges, Florida Pulp and Paper Company, Pensacola, Fla.
Helen U. Kiely, American Writing Paper Company, Holyoke, Mass.
L. K. Larsen, Weyerhaeuser Timber Company, New York, N. Y.
E. C. Lathrop, U. S. Department of Agriculture, Peoria, Ill.
P. M. Loddengaard, Bulkley, Dunton and Company, New York, N. Y.

Vocational Training Committee

The association has always taken considerable interest in vocational education for mill operators and technically trained men.

In 1933 it cooperated with the Federal Board for Vocational Education in the preparation of Bulletin 168 on Vocational Training in the Pulp and Paper Industry.

The personnel of the newly reorganized committee consists of:

W. L. Cassiday, Chairman, Michigan Department of Education, Port Huron, Mich.
E. W. Kendall, International Correspondence Schools, Scranton, Pa.
L. J. McNamara, Marathon Paper Mills, Rothschild, Wis.
D. J. Thomson, Champion Paper and Fibre Company, Hamilton, Ohio.

Pulp Manufacture Division

Acid Pulping Committee

The Acid Pulping, or as formerly known, the Sulphite Pulping Committee, deals with the processes of acid liquor making and digesting, and subsequent riffling, screening, washing and thickening prior to stuff preparation. Its contributions to the Association and the meetings have been voluminous and valuable. In 1928 it sponsored the publication of "The Chemistry of the Sulphite Process" by Miller and Swanson of the Forest Products Laboratory.

It is at present working on Project No. 83 on Technical Control of the Sulphite Process.

Its present personnel is as follows:

H. A. DuBois, Chairman, Kimberly-Clark Corporation, Neenah, Wis.
G. H. Chidester, Forest Products Laboratory, Madison, Wis.
R. J. LeRoux, Weyerhaeuser Timber Company, Longview, Wash.
N. L. Malcove, Northern Paper Mills, Green Bay, Wis.

It is assisted by an advisory subcommittee:

O. E. Anderson, International Paper Company, Livermore Falls, Maine.
V. P. Edwardes, International Paper Company, Palmer, N. Y.
W. N. Kelly, Weyerhaeuser Timber Company, Longview, Wash.
B. T. Larrabee, Brown Company, Berlin, N. H.
A. D. Merrill, Chemipulp Process Inc., Watertown, N. Y.
R. N. Miller, Oxford Paper Company, Rumford, Me.
W. H. Swanson, Kimberly-Clark Corporation, Neenah, Wis.

Alkaline Pulping Committee

This committee is a combination of the former Soda Pulping and Sulphate Pulping Committees and deals with all alkaline pulping processes.

Following are the current projects:

No. 94. Method of Measuring Soda Losses in Recovery Plant Stacks
No. 122. Determination of Sodium in Pulp Mill Materials
No. 123. Determination of Sulphur in Pulp Mill Materials
No. 124. Preparation of a Complete Phase Diagram (Boiling and Freezing Points) of the System Na_2CO_3-Na_2S

No. 125. Development of an Accurate System of Complete Analysis of White Liquor to Include Alumina, Silica, Sulphate, Thiosulphate and Polysulphide.

It has developed four Standards:

O 400 p-36 Standard Terms Used in the Sulphate Pulping Process

O 401 p-40 Alkaline Pulping Thermal Code

O 402 p-37 Standard Terms Used in the Soda Pulping Process

O 404 p-37 Sulphate Recovery Thermal Code

Its present personnel is as follows:

Paul Hodges, Chairman, Florida Pulp and Paper Company, Pensacola, Fla.

M. W. Bray, Forest Products Laboratory, Madison, Wis.

W. P. Lawrence, Champion Paper and Fibre Company, Canton, N. C.

E. M. Leavitt, Hollingsworth and Whitney, Mobile, Ala.

A. B. Moore, Crossett Paper Mills, Crossett, Ark.

W. S. Richardson, Gaylord Container Corporation, Bogalusa, La.

C. W. Scott, Southern Kraft Corporation, Moos Point, Miss.

G. H. Tomlinson, Howard Smith Paper Mills, Montreal, Que.

W. T. Webster, Brunswick Pulp and Paper Company, Brunswick, Ga.

Mechanical Pulping Committee

This committee deals with the groundwood and related processes and is at present working on two projects:

No. 153. Survey of Groundwood Pulp Quality

No. 173. Survey of Refining of Tailings

R. F. Huntley, Chairman, reports as follows:

"Your committee has as its principal aim to keep informed of any new developments and progress in the mechanical pulping field and to keep the membership of our Association informed of them. This is accomplished by the papers and reports presented at the fall and winter meetings. Those who have made contributions of one sort or another in this art are asked to write and present papers describing their work.

"At the winter meeting this year papers were presented on the subject of grinding, refining of tailings and testing the drainage resistance of groundwood. Your committee hopes to be able to present equally interesting programs and discussions at their future meetings.

"During the past year questionnaires were made up and sent to a representative list of mills. The questions contained therein covered a wide variety of phases in groundwood manufacture including pulp testing methods, pulp testing equipment, species of wood ground and methods of identification, types of grinders, types of stones used and recovery of screenings. A gratifying number of mills receiving this questionnaire responded and a study and summary of these replies is now being made for early presentation. It is hoped that from the information obtained a start can be made toward a more unified procedure in mechanical pulp testing."

The committee personnel, at present, is as follows:

R. F. Huntley, Chairman, Sealright Company, Fulton, N. Y.

R. M. Drummond, International Paper Company, Glens Falls, N. Y.

Lyman Beeman, St. Regis Paper Company, Deferiet, N. Y.

W. O. Hisey, New York State College of Forestry, Syracuse, N. Y.

A. T. Gardner, Provincial Paper Ltd., Port Arthur, Ont.

Henry Perry, J. P. Lewis Company, Beaver Falls, N. Y.

It is assisted by an advisory subcommittee:

L. C. Burdick, St. Regis Paper Company, Deferiet, N. Y.

D. A. Hunter, Berst-Forster-Dixfield Company, Plattsburg, N. Y.

J. C. Pew, Forest Products Laboratory, Madison, Wis.

V. L. Tipka, Hawley Pulp and Paper Company, Oregon City, Ore.

W. J. Walker, Johns-Manville Company, Manville, N. J.

Pulp Purification Committee

D. T. Jackson, chairman, reports as follows:

"The committee was organized to promote the study of the various phases of pulp purification with special attention to chlorination, alkaline extraction and oxidative stages of pulp bleaching. The committee believes that it can render a service to the industry by collecting and making available through sponsored symposia, published reviews or other means, all information which is available on each specific phase of the pulp purification process. It is hoped in this to focus attention on points which require further investigation. Then, if it seems justified, the committee will recommend a sponsored research program to clear up these important questions.

"As one means of furthering the objects of the committee, we have sponsored the preparation of an annual review of the literature of bleaching for each of the past three years:

"These reviews have proved so helpful to workers in the pulp and paper industry that their scope was extended to cover the literature of the purification of pulps for dissolving purposes. The first review on this subject, prepared by Dr. Fred Olsen and his co-workers, was presented by title at the 1941 annual meeting and will be published soon.

"A symposium on 'The Chlorination of Chemical Wood Pulps' was given at the 1941 annual meeting. It is planned to continue the series with a symposium on 'The Alkaline Treatment and Purification of Chemical Wood Pulps' at the 1942 annual meeting, followed by a similar program devoted to 'The Oxidative Bleaching Stage' at the 1943 annual meeting.

Jackson and Parsons, *Paper Trade J.* 108, *TAPPI Sect.* 240-6 (May 18, 1939).

Jackson and Parsons, *Tech. Assoc. Papers* 23, 256-62 (1940).

Parsons and Tongren, *Paper Trade J., TAPPI Sect.*, pp. 266-72 (May 29, 1941).

Supplementary programs are planned for the fall meetings during these years.

"A round table discussion, featuring a number of papers on the 'Determination of Oxidizable Materials in Pulp (Bleachability), Liquors and Wash Waters,' organized in cooperation with the Subcommittee on Oxidizable Materials, Committee of Standards and Methods, Cellulose Division, American Chemical Society, will be given at the 1941 fall meeting, Ann Arbor, Mich.

"An important part of the work of the committee in making information on the subject of pulp purification readily available lies in providing translations or abridgments of the reports of work on this subject done in European laboratories. The first contribution of this type offered by our committee is a translation of the important article by Loeschbrandt, 'The Bleaching of Sulphate Pulp,' to be issued as a monograph by the Technical Association in August. (The committee wishes to express its appreciation to Dr. Loeschbrandt for permission to publish the translation and to Dr. John Schuber, of the Solvay Process Company, who arranged for it. The committee is especially indebted to Dr. E. Martin, also of Solvay Process Company, who made the translation.)

"The question of publishing a monograph on the subject of Pulp Bleaching and Purification has been considered by our committee. The matter is still in abeyance."

The committee personnel, at present, is as follows:

D. T. Jackson, chairman, Hammermill Paper Company, Erie, Pa.
N. W. Coster, Soundview Pulp Company, Everett, Wash.
Emil Heuser, Institute of Paper Chemistry, Appleton, Wis.
H. R. Murdock, Champion Paper and Fibre Company, Canton, N. C.
Fred Olsen, Western Cartridge Company, East Alton, Ill.
John D. Rue, Hooker Electrochemical Company, Niagara Falls, N. Y.

It is assisted by the following advisory subcommittee:

John D. Rue, chairman, Hooker Electrochemical Company, Niagara Falls, N. Y.
R. S. Baker, Beebe, Que.
F. G. Calkin, Virginia Smelting Company, Norfolk, Va.
F. Casciani, Niagara Alkali Company, Niagara Falls, N. Y.
Homer Eaton, Michigan Alkali Company, Wyandotte, Mich.
R. P. Hill, Pulp Bleaching Company, Wausau, Wis.
C. W. Holt, Diamond Alkali Company, Pittsburgh, Pa.
I. E. Muskat, Pittsburgh Plate Glass Company, Barberton, Ohio
W. L. Savell, Mathieson Alkali Company, New York, N. Y.
John Schuber, Solvay Process Company, Syracuse, N. Y.
E. G. Thompson, Dow Chemical Company, Seattle, Wash.
T. W. Toovey, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.

Paper Manufacture Division

Preparation of Nonfibrous Materials Committee

C. M. Connor, Chairman, reports as follows:

"The Preparation of Nonfibrous Materials Committee was originated with the purpose of studying the processes of preparing, for mill use, all nonfibrous materials used in the manufacture of pulp and paper. These materials include: size, dyestuffs, clays or starch, bleach liquor and others. During the past nine years considerable time has been spent during the annual meetings in discussion of these materials. The subject of sizing and fillers have been thoroughly covered in symposium type meetings.

"A survey of the industry was made covering the preparation of bleach liquor. Further along these lines, the committee sponsored a special investigation on bleach liquor stability. Each year new nonfibrous materials appear and of these, plasticizers such as glycerine and synthetic resins, have received recent attention.

"It is the aim of the present committee to follow the new developments in the field of nonfibrous materials and endeavor to bring available information on these materials before the members at the annual meeting."

Its present personnel is as follows:

C. Maurice Connor, chairman, Valley Forge Laboratories, W. Conshohocken, Pa.
R. M. K. Cobb, Lowe Paper Company, Ridgefield Park, N. J.
J. H. Fritz, National Oil Products Company, Harrison, N. J.
A. J. Luettgen, P. H. Glatfelter Company, Spring Grove, Pa.
M. D. Reuben, International Paper Company, York Haven, Pa.
E. H. Smith, Crossett Paper Mills, Crossett, Ark.
F. A. Soderberg, General Dyestuffs Company, New York, N. Y.
F. A. Steele, Minnesota Mining and Manufacturing Corporation, St. Paul, Minn.
T. W. Toovey, Pennsylvania Salt Manufacturing Company, Philadelphia, Pa.
R. S. Yates, Mead Corporation, Chillicothe, Ohio.

Stuff Preparation Committee

This is one of the oldest committees in the Association and deals with the processes of washing, beating, sizing, loading, coloring, refining, screening, metering and proportioning of the fibrous suspension prior to its delivery to the paper and paperboard machine. It has conducted sessions for the presentation of papers at each annual meeting during the life of the association.

Its present personnel is as follows:

Ward D. Harrison, chairman, Ecusta Paper Company, Brevard, N. C.
James Coghill, Noble & Wood Machine Company, Hoosick Falls, N. Y.
Jacob Edge, Downingtown Manufacturing Company, Downingtown, Pa.

Arno W. Nickerson, Consulting Engineer, New York, N. Y.
Lionel Sutherland, Sutherland Refiner Corporation, Trenton, N. J.
R. W. K. Ulm, Ohio Boxboard Company, Rittman, Ohio.

There are two projects in current operation:

No. 17. Study of Beating and Refining Equipment (Details of Design, Capacities, Power Requirements and Performance).
No. 191. Development of a Fiber Classification Test.

FORMING AND FINISHING COMMITTEE

This is the former Paper Manufacture Committee and deals with the processes of paper and paperboard manufacture and finishing from the machine chest to the shipping platform.

It is at present working on Project No. 100 on Fourdrinier Wire Drainage and has conducted sessions on Fourdrinier and cylinder machine design and operation for many years.

Its present personnel is as follows:

Albert E. Bachmann, chairman, Missisquoi Corporation, Sheldon Springs, Vt.
George D. Bearce, Maine Seaboard Paper Company, Bucksport, Me.
S. W. Blanchard, Dill & Collins, Inc., Philadelphia, Pa.
W. E. Brawn, Pejepscot Paper Company, Brunswick, Me.
H. D. Cook, Sweet Brothers Paper Manufacturing Company, Phoenix, N. Y.
P. H. Goldsmith, Pusey & Jones Corporation, Wilmington, Del.
E. P. Ingalls, S. D. Warren Company, Cumberland Mills, Me.
J. W. Joslyn, Sandy Hill Iron and Brass Works, Hudson Falls, N. Y.
B. L. Kassing, Hammermill Paper Company, Erie, Pa.
R. T. Mann, Foster Paper Company, Utica, N. Y.
A. L. Sherwood, Sutherland Paper Company, Kalamazoo, Mich.
H. G. Specht, Eastwood-Neally Corporation, Belleville, N. J.

Testing Division

FIBROUS MATERIALS TESTING COMMITTEE

B. E. Lauer, chairman of the Fibrous Materials Testing Committee, reports as follows:

"There is perhaps no major process industry today which lacks more real information concerning the chemical and physical properties of its raw materials than does the pulp and paper industry. Wood, the chief raw material of pulpmaking, is purchased and used with only the sketchiest knowledge of the quality or, even in most cases, the quantity of pulp which can be made from any species of pulpwood.

"In recognition of this situation the Fibrous Materials Testing Committee was organized during the year of 1931-32 with M. A. Youtz, research director of the Northern Paper Mills, as its chairman. This was an outgrowth of the earlier Fibrous Materials Testing Committee. The committee continued under the chairmanship of Dr. Youtz until 1937 when he resigned to be replaced by C. E. Hrubesky of the U. S. Forest Products Laboratory. The latter also resigned early this year and the committee is now under the guidance of B. E. Lauer, a member of the faculty of North Carolina State College.

"The function of this committee as first outlined was in the fields of 'species identification and other determination of pulping qualities' and 'the study of various woods suitable for pulping by the known processes'.

"The first and primary task of the committee has been to assemble, examine, revise and standardize the methods in use for the examination of wood quantity and quality. Endeavor to this end has led to the formulation of methods for the determination of such features of wood quality as moisture content, cold and hot water solubility, one per cent alkali solubility, ether solubility, alcohol-benzene solubility, and the estimation of methoxyl content, and to an attempt to classify wood according to a quantity standard. These methods have all been published in the Association Standards either in an official, tentative or proposed form. Attention directed to this publication will indicate to the observer that even these methods, after adoption as standards, are not allowed to remain dormant but are constantly subjected to the critical scrutiny of the committee with a view toward improvement in methods or further standardization.

"This same trend of action has also led to the bulk of the present committee program. Methods are under consideration for the estimation of dirt in wood chips and the correlation of these figures with the dirt count of paper, an analysis of chip size and the relation of this analysis to plant operation, the use of hydroxylamines for the determination of cellulose in wood to replace the older and more complicated Cross and Bevan method for cellulose, the sampling of rags, and the identification of pulpwood trees by visual inspection. A project long under study by various members of this committee and others 'The Identification of Nonwoody Fibers' has been turned over to the Microscopy Committee for final analysis. It is quite likely that all or most of the methods listed above will be in a suitable form to be presented to the industry within the next year.

"This committee is now completing the details incident to the standardization and adoption of the more commonly used methods of analysis of fibrous raw materials and hence is drawing to the close of take a wider scope of endeavor and in this way to the first phase of the work. It is now ready to underrealize more closely the original functions of the committee. As a matter of fact a step in this direction has already been taken in connection with the work being done on the use of hydroxylamines for a determination of cellulose in wood. Without doubt, other procedures will be devised which will simplify the methods of industrial examination of fibrous raw materials for pulpmaking.

"It is the aim then of this committee this year and for the years ahead to assist in the formulation

of new procedures designed for the purpose of readily determining pulpwood quality and quantity and to search for and to discover, if possible, a convenient, accurate, and infallible laboratory method for estimating the yield of commercial pulp from any wood by any ordinary pulping process. When that has been done, at least one of the primary goals of the committee will have been reached, and that, it is felt, is the most important immediate objective."

The committee is at present working on the following projects:

No. 24. Estimation of Dirt in Chips.
No. 104. Physical Evaluation of Pulp Cordwood (Revision).
No. 142. Chip-Size Analysis.
No. 156. Use of Hydroxylamines for Determination of Cellulose in Wood.
No. 160. Identification of Pulpwood Trees by Visual Inspection.

The personnel is as follows:

B. E. Lauer, chairman, North Carolina State College, Raleigh, N. C.
W. C. Christensen, Hoberg Paper Mills, Green Bay, Wis.
C. E. Hrubesky, Forest Products Laboratory, Madison, Wis.
E. L. Lamb, Oxford Paper Company, Rumford, Maine.

Pulp Testing Committee

The Pulp Testing Committee has been active almost since the beginning of the Association. It was originally organized to develop a method for estimating the weight and moisture content of pulp. Today its scope covers the physical and chemical methods of evaluating all kinds of pulp. It has developed a number of Association standards.

The following are its current projects:

No. 29. Freeness Measurement.
No. 132. Laboratory Processing of Pulp (Revision of T 200 m).
No. 133. Weighing, Sampling and Testing Woodpulp (Revision of T 210 m).
No. 134. Permanganate Number of Pulp (Revision of T 214 m).
No. 136. Dirt in Pulp (Revision of T 213 m).
No. 138. Bleach Consumption of Pulp.
No. 140. Shives in Pulp.

The present personnel is as follows:

W. O. Hisey, chairman, New York State College of Forestry, Syracuse, N. Y.
E. F. Anderton, Scott Paper Company, Chester, Pa.
F. W. Brainerd, Scott Paper Company, Chester, Pa.
H. S. Bristol, International Paper Company, Niagara Falls, N. Y.
H. U. Kiely, American Writing Paper Company, Holyoke, Mass.
C. M. Koon, Institute of Paper Chemistry, Appleton, Wis.
E. L. Lamb, Oxford Paper Company, Rumford, Maine.
Gerard Larocque, Daily News Syndicate, New York, N. Y.
E. D. Rich, Richaven Investment Company Laboratories, Tacoma, Wash.
R. W. K. Ulm, Ohio Boxboard Company, Rittman, Ohio.

Paper Testing Committee

B. W. Scribner, chairman of the Paper Testing Committee, reports as follows:

"The Paper Testing Committee was one of the first of the Association committees organized for development of standards—it is nearly as old as the Association itself. Its work has been continuously directed by Chiefs of the Paper Section of the National Bureau of Standards. Its early work under the direction of Frederic C. Clark resulted in recommended testing procedures for the microscopic, chemical, and physical determinations commonly employed at the time, and these were published in pamphlet form. The work was continued by the next chairman, Frederick A. Curtis, and under his direction many additional methods were formulated.

"When the present chairman, B. W. Scribner, was appointed in 1925, he proposed the preparation of paper testing methods in a standard form and having them adopted as official standards of the Association. In collaboration with the then secretary, W. G. MacNaughton, a plan for doing this was developed, which is essentially the same procedure as that now being used for all Association standards. This marked initiation of systematic standardization work by the Association.

"The standard methods for paper testing now number 50, and they cover all branches of testing—chemical, physical, optical, and microscopic. The development work is done largely by subcommittees appointed to deal with specific subjects. Revisions of the standards are constantly in progress to keep them abreast of current developments, and many of them have been revised several times. The present development work on new methods comprises determination of writing quality, erasing quality, and paraffin absorptiveness.

"A few years ago the A.S.T.M. took up the development of paper testing standards and this is being coordinated very satisfactorily with the Technical Association standardization work by means of a joint committee of the two organizations."

Following are the current projects of the committee:

No. 41. Grease Resistance of Paper.
No. 45. Bursting Strength of Paper (Revision).
No. 46. Stretch of Paper.
No. 54. Erasing Quality of Paper.
No. 63. Hydrogen Ion Concentration of Paper (Revision).
No. 99. Wet Tensile Strength of Paper.
No. 108. Writing Quality of Paper.
No. 161. Wire and Felt Sides of Paper.
No. 178. Paraffin Absorptiveness of Paper.
No. 179. Heat Test for Stability of Paper.

The personnel of the committee is as follows:

B. W. Scribner, chairman, National Bureau of Standards, Washington, D. C.

G. J. Brabender, Marathon Paper Mills, Rothschild, Wis.
J. d'A. Clark, Institute of Paper Chemistry, Appleton, Wis.
R. M. K. Cobb, Lowe Paper Company, Ridgefield Park, N. J.
P. W. Codwise, Beaver Products Company, Thorold, Ont.
T. L. Crossley, Consulting Chemist, Toronto, Ont.
J. D. Davis, Dill & Collins, Inc., Philadelphia, Pa.
S. C. Fairbanks, Hamersley Mfg. Company, Garfield, N. J.
M. S. Kantrowitz, Government Printing Office, Washington, D. C.
H. U. Kiely, American Writing Paper Company, Holyoke, Mass.
C. M. Coon, New York State College of Forestry, Syracuse, N. Y.
C. E. Libby, New York State College of Forestry, Syracuse, N. Y.
H. L. Mellen, American Cyanamid and Chemical Company, New York, N. Y.
L. S. Reid, Metropolitan Life Insurance Company, New York, N. Y.
E. Sutermeister, S. D. Warren, Inc., Cumberland Mills, Maine.
A. W. Tedrow, Hawley Pulp and Paper Company, Oregon City, Ore.
P. F. Wehmer, Electrical Testing Laboratories, New York, N. Y.
B. L. Whemhoff, West Virginia Pulp and Paper Company, New York, N. Y.
E. S. Worth, Paterson Parchment Paper Company, Bristol, Pa.

Following is the personnel of the Testing Instruments Subcommittee:

E. J. Albert, chairman, Thwing-Albert Instrument Company, Philadelphia, Pa.
W. L. Egy, W. & L. E. Gurley Company, Troy, N. Y.
W. L. Foote, B. F. Perkins Company, Holyoke, Mass.
Lewis Muskat, R. Fuess and Company, New York, N. Y.
H. Z. Schniewind, Testing Machines Inc., New York, N. Y.
F. M. Williams, Williams Apparatus Company, Watertown, N. Y.

Following is the personnel of the Erasing Properties Subcommittee:

P. W. Codwise, chairman, Beaver Products Company, Thorold, Ont.
D. A. Cameron, Lincoln Pulp and Paper Company, Merritton, Ont.
F. T. Carson, National Bureau of Standards, Washington, D. C.
R. M. K. Cobb, Lowe Paper Company, Ridgefield Park, N. J.
G. H. Lafontaine, Howard Smith Paper Company, Cornwall, Ont.
H. U. Kiely, American Writing Paper Company, Holyoke, Mass.

Following is the personnel of the Absorptiveness to Paraffin Subcommittee:

S. C. Fairbanks, chairman, Hamersley Manufacturing Company, Garfield, N. J.
G. F. Des Autels, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.
J. J. Forsyth, Fraser Companies, Inc., Madawaska, Maine.
K. E. Kretlow, Pollock Paper and Box Company, Dallas, Texas.
T. W. Noble, Detroit Wax Paper Company, Detroit, Mich.

Optical Properties Committee

This was formerly the Color Committee and later a subcommittee of the Paper Testing Committee and deals with the optical properties of paper such as brightness, glare, color, etc. Its membership represents the Association in the Inter-Society Color Council, a national organization of professional societies interested in color problems.

At present it is working on two projects:

No. 143. Magnesium Oxide Reflectance Standard.
No. 144. Feeding Quality of White and Colored Papers.

Its present personnel is as follows:

M. N. Davis, chairman, Kimberly-Clark Corporation, Neenah, Wis.
E. J. Albert, Thwing-Albert Instrument Company, Philadelphia, Pa.
J. d'A. Clark, Institute of Paper Chemistry, Appleton, Wis.
H. U. Kiely, American Writing Paper Company, Holyoke, Mass.
H. W. Morgan, Munising Paper Company, Munising, Mich.
J. L. Parsons, Hammermill Paper Company, Erie, Pa.
B. W. Scribner, National Bureau of Standards, Washington, D. C.
E. Sutermeister, S. D. Warren, Inc., Cumberland Mills, Maine.
P. F. Wehmer, Electrical Testing Laboratories, New York, N. Y.

The membership of the Advisory Subcommittee is as follows:

A. C. Hardy, Massachusetts Institute of Technology, Cambridge, Mass.
D. B. Judd, National Bureau of Standards, Washington, D. C.
G. C. Munro, Champion Paper and Fibre Company, Hamilton, Ohio.
Philip Nolan, Institute of Paper Chemistry, Appleton, Wis.
J. A. Van den Akker, Institute of Paper Chemistry, Appleton, Wis.

Microscopy Committee

In July 1940 this committee which was formerly a subcommittee of the Paper Testing Committee was established as an independent committee.

One of the first requests made of the new committee was the revision of the Association standard T 401 m-39 on the fiber composition of paper. This work has been going on for two years and a new standard should soon be available. A questionnaire

was sent to the industry to ascertain the extent of microscopic work going on and for what purpose. On the basis of the responses the following projects were begun:

No. 42. Weight Factors in Microscopic Analysis.
No. 105. Identification of Fibers Other than Wood in Paper.
No. 111. Study of the C-Stain.
No. 176. Fiber Composition of Paper (Revision of T 401 m).

The present personnel is as follows:

F. W. Bentzen, chairman, Kimberly-Clark Corporation, Neenah, Wis.
J. W. Appling, Institute of Paper Chemistry, Appleton, Wis.
F. A. Burningham, Brown Company, Berlin, N. H.
K. P. Geohegan, Aetna Paper Company, Dayton, Ohio.
J. H. Graff, Institute of Paper Chemistry, Appleton, Wis.
F. W. O'Neil, New York State College of Forestry, Syracuse, N. Y.
L. S. Reid, Metropolitan Life Insurance Company, New York, N. Y.
R. H. Simmons, Government Printing Office, Washington, D. C.

Chemical Methods Coordination Committee

B. L. Browning, chairman of the Chemical Methods Coordination Committee, reports as follows:

"The Chemical Methods Coordination Committee was organized in 1940 for the purpose of securing greater ultimate uniformity in methods dealing with more than one type of material. The scope of the committee at present includes methods of dealing with chemical analysis of fibrous raw materials and pulp, of pulp and paper, or of all three. It is not the purpose of the committee to duplicate the work of any existing committee and projects dealing with analysis of only one type of material have remained with the committee to which they were originally assigned.

"The organization of a new committee in active functioning form is a formidable task, and in the critical consideration of revisions and new methods, considerable time is required before constructive accomplishment becomes apparent. However, the Chemical Methods Coordination Committee has been actively functioning in examinations of revision of methods and in establishment of certain new methods which have not heretofore existed as Association methods. Active participation in the work of the committee, whether by direct membership or otherwise, by those not now so associated will be welcome.

"The committee is now engaged in consideration of methods for sample preparation and determination of ash and pentosans in wood, pulp, and paper; of extractives, lignin, and methoxyl content of wood and pulp; and of copper number of pulp and paper. Other projects to receive consideration in the near future have already been established."

The present personnel of this committee is as follows:

B. L. Browning, chairman, Institute of Paper Chemistry, Appleton, Wis.
Milton Fillius, Eastman Kodak Company, Rochester, N. Y.
E. C. Jahn, New York State College of Forestry, Syracuse, N. Y.
G. J. Ritter, Forest Products Laboratory, Madison, Wis.
P. F. Wehmer, Electrical Testing Laboratories, New York, N. Y.

Nonfibrous Materials Testing Committee

From its early days the Association has devoted much time to the development of testing methods for such materials as size, alum, fillers, water, casein, etc. The results have been recorded in the T 600-series in the Standards.

Current work deals with beater and coating starches, sizing materials, pigments and clay.

The present personnel is as follows:

W. F. Hathaway, chairman, Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.
W. A. Kirkpatrick, Allied Paper Mills, Kalamazoo, Mich.
H. C. Parish, Skinner and Sherman, Boston, Mass.
Fred Shankweiler, Hercules Powder Company, Kalamazoo, Mich.
E. B. Taylor, American Cyanamid and Chemical Company, Kalamazoo, Mich.
M. R. Wilkins, Bryant Paper Company, Kalamazoo, Mich.

Research Development Division

Abstracts and Bibliography Committee

Clarence J. West, chairman of the Abstracts and Bibliography Committee, reports as follows:

"Very soon after the organization of TAPPI, the value of abstracts and bibliography was recognized and committees were appointed with Ross Campbell in charge of abstracts and H. E. Surface in charge of bibliography. Because there was a certain parallelism in the work of the two committees they were combined under the present chairman in 1923.

"That portion of the work of the committee which deals with abstracts has consisted in the preparation and publication through the *Paper Trade Journal* of abstracts of the pertinent periodical and patent literature dealing with pulp and paper manufacture and its many ramifications. There are a large number of articles and patents which deal with subjects outside the scope of Chemical Abstracts and British Chemical Abstracts and, therefore, it is felt that this service has been a distinct contribution to the industry. In order that these abstracts might be more accessible, the chairman of the committee, since 1922, has prepared indexes of the individual volumes of the *Technical Section* of the *Paper Trade Journal;* one who is fortunate enough to have these volumes has access to practically the world's literature on pulp and paper manufacture.

"During the early years of the work on bibliography, the efforts of the committee were devoted largely to the preparation of lists on books and articles on

special subjects or covering the activities of various research groups. Some fifty contributions of this nature were compiled. In 1920 the present chairman began the preparation of an annual bibliography of papermaking; up to 1930 these were published in the PAPER TRADE JOURNAL and in the *Technical Association Papers*. In 1926 the compilation of United States Patents was started. Because of the increasing volume of papermaking literature, it became necessary, in 1931, to combine the bibliography and the patent list and issue them as a separate volume. At first these were published with a paper cover but since 1936 they have been given the dignity of a cloth binding.

"In order to further facilitate research and study in the field of the pulp and paper industry, TAPPI in cooperation with the Lockwood Trade Journal Company issued in 1929 the first of two collective volumes, covering the literature from 1900 to 1928; the second volume, published in 1926, covered the period from 1928 to 1935. These volumes present a rather complete survey of all pertinent periodical literature of interest to the industry. Unfortunately, the support afforded these volumes has been such that additional collective volumes are not economically feasible.

"For the past two years the volume of material from the Annual and the Fall meeting of TAPPI has been such that it has been impossible to publish abstracts in the PAPER TRADE JOURNAL. However, plans are now under way by which this material will be made available to the membership of TAPPI through a special bulletin to be issued by the Association.

"In addition to the two principal activities of the committee, it has prepared surveys of the research activities in Government and university laboratories in the United States and Canada and also a survey of the patents on the utilization of waste liquors and gases."

The present personnel is as follows:

C. J. West, chairman, Institute of Paper Chemistry, Appleton, Wis.
A. Papineau-Couture, Department of Health, Montreal, Que.
J. F. Ohlson, Continental-Diamond Fibre Company, Bridgeport, Pa.

FUNDAMENTAL RESEARCH COMMITTEE

Harry F. Lewis, chairman of the Fundamental Research Committee, reports as follows:

"On June 3, 1932, the writer was asked by Carl Curran, chairman of the Research Development Division to serve as chairman of a new committee on fundamental research. The original committee consisted of W. Boyd Campbell of the Forest Products Laboratory of Canada, V. W. McCready of the Chemical Engineering Department of the University of Michigan, Fred Olsen of the Western Cartridge Company, and H. F. Lewis of the Institute of Paper Chemistry. Throughout the nine years which have elapsed since the organization of the committee, three of the four original members have been in continuous service. In addition, a large number of others have from time to time served on the committee.

"The functions of the Fundamental Research Committee may be stated as follows:

"To list fundamental research problems; to encourage the investigation by properly equipped university and other competent research laboratories of problems of interest and value to the paper and pulp industry and to be in a position to suggest such problems and to assist in their development and application; to stimulate the publication of fundamental research work; to review critically papers appearing over the name of the Fundamental Research Committee; and to study the organization and administration of research departments.

"One of the first projects undertaken was that of putting out through the TAPPI channels special inquiry 192 in which the members of TAPPI were asked to outline those problems of fundamental nature whose answer would be of value in the industry. A total of some 105 projects was suggested, and on August 18, 1933, Special Report 192 was issued to the TAPPI membership. Many valuable suggestions were received. From a consideration of these and the ideas of committee members, a tentative listing of fundamental problems was drawn up in January, 1934. After some modification, this was resubmitted to TAPPI and to the laboratories of universities and public or semipublic institutions interested in research in cellulose. At the same time an attempt was made to determine what specific research problems of a fundamental nature relating to pulp and paper were being carried out by these various laboratories.

"Without attempting to indicate specifically the results of the work of the committee in presenting definite problems of a fundamental nature, it may be said that ever since the establishment of the committee, many fundamental research papers have been presented to both the Fall and Spring meetings of TAPPI. A number of Symposia have been held in connection with these meetings. Financial grants for the support of fundamental research have been allocated by TAPPI to the University of Idaho, the New York State College of Forestry, the Forest Products Laboratory, and the Institute of Paper Chemistry, and reports covering the specific problems have appeared in the PAPER TRADE JOURNAL and in *Technical Association Papers*.

"The chairman of the Fundamental Research Committee has served as chairman of the Committee on Cellulose and Allied Substances of the National Research Council, and various members of the committee have been chairmen of the Cellulose Division of the American Chemical Society, have served on the Executive Committee of the Division, and have carried on a considerable amount of fundamental work in cellulose in connection with that Division.

"On reading over the original program drawn up in 1933 and 1934, it is evident that answers have been obtained for a number of the questions outlined; nevertheless, because of the development of new processes and new tools, it would seem as though just as much work remains to be done as was originally set up."

The personnel of this committee is as follows:

H. F. Lewis, chairman, Institute of Paper Chemistry, Appleton, Wis.
F. E. Brauns, Institute of Paper Chemistry, Appleton, Wis.
W. B. Campbell, Canadian Pulp and Paper Association, Montreal, Que.
J. R. Fanselow, Kimberly-Clark Corporation, Neenah, Wis.
Emil Heuser, Institute of Paper Chemistry, Appleton, Wis.
Harold Hibbert, McGill University, Montreal, Que.
E. H. Hill, West Virginia Pulp and Paper Company, Covington, Va.
E. C. Jahn, New York State College of Forestry, Syracuse, N. Y.
Frederick Olsen, Western Cartridge Company, E. Alton, Ill.
F. C. Peterson, Dow Chemical Company, Midland, Mich.
E. W. Samson, Hammermill Paper Company, Erie, Pa.

BACTERIAL CONTROL METHODS COMMITTEE

Allen Abrams, chairman of the Bacterial Control Methods Committee, reports:

"This committee was set up to determine the significance of bacteria in the manufacture of pulp and paper, particularly regarding any public health aspects; to set standard methods of measurement of bacteria; and to assist the industry in solving problems of a microbiological nature.

"Thus far the committee has set up and published standard methods for the determination of bacteria; has conducted several symposia at Association meetings, dealing with some of the aspects of this problem; has carried on coordinated work with the American Paper and Pulp Association through the Institute of Paper Chemistry. Thus far a considerable number of surveys have been conducted at various mills, and certain aspects of bacterial control in pulp and paper making have been studied."

The personnel of this committee is as follows:

Allen Abrams, chairman, Marathon Paper Mills, Rothschild, Wis.
W. R. Barber, Crown-Zellerbach Corporation, Camas, Wash.
T. L. Doutt, Champion Paper and Fibre Company, Canton, N. C.
R. F. Huntley, Sealright Company, Fulton, N. Y.
R. H. Torrey, Riegel Paper Corporation, New York, N. Y.

PATENTS COMMITTEE

C. W. Rivise, chairman of the Patents Committee, reports as follows:

"The Patents Committee was instituted in 1930 under the divisional organization to round out the activities of the Association and to fill a long-felt need among technical men engaged in the pulp and paper industries.

"The committee's objectivities have been: To cooperate with the patent committees of other technical associations as well as with those of law associations in improving the Patent System; to watch the patent situation, including legislation and decisions of patent tribunals insofar as they may affect the protection of inventions relating to the pulp and paper industry and to keep the members of the Association informed thereof; to advise the Executive Committee from time to time as to what action should be taken by the association in reference to proposed or pending legislation; to give information from time to time to enable the members of the association to avail themselves to the fullest extent of the good features of the patent system and to avoid the many obstacles and pitfalls; and to present from time to time discussions of a general nature relating to patent matters of particular interest to the paper industry.

"The work accomplished by the committee has been summarized in the annual reports presented at the February meetings of TAPPI, which reports have been published in the PAPER TRADE JOURNAL. As can be seen from these reports, a great deal of the committee's work has gone into the preparation of bulletins covering essential information for the protection of inventions and discoveries. Bulletins have also been issued to explain important decisions of the courts relating to the validity and infringement of patents in the field of pulp and paper. The committee has also sponsored a number of talks delivered at the Annual and Fall meetings of TAPPI. Many of the bulletins and talks have been published not only in the important paper magazines of this country, Canada and England, but also in other magazines such as the Textile World, the Chemist and the Journal of the Patent Office Society.

"The committee has taken an active part in proposed changes in the law and practice relating to patents. For instance, the committee made an independent study of the subject of compulsory licensing of patents, and with the approval of the Executive Committee filed a report with the Patents Committee of the House of Representatives opposing compulsory licensing. The report was published as part of the hearings and may be found on pages 563-565 of 'Hearings Before the Committee on Patents, Subcommittee on Compulsory Licensing, House of Representatives, 1938.'

"As an indication that the committee is concerned with important problems of the day, it may be stated that at the February, 1931 annual meeting, it sponsored a paper entitled 'Patents and Preparedness.' At the fall meeting, the committee is sponsoring a paper on the latest changes in patent law and procedure, and in the near future it is expected that a symposium on patents will be held."

The present membership of the committee is as follows:

Charles W. Rivise, chairman, Caesar and Rivise, Philadelphia, Pa.
Herman W. Richter, Geo. W. Jenkins Company, Bridgewater, Mass.
A. D. Merrill, Chemipulp Process, Inc., Watertown, N. Y.
J. A. DeCew, Consulting Engineer, Mt. Vernon, N. Y.
Ralph H. McKee, Professor Emeritus, Columbia University, New York, N. Y.

Converting and Consuming Division

Coating Committee

The Coating Committee deals with the processes of coating paper and paperboard with casein, starch, glue, gum, wax, varnish, cellulose, esters and other coating materials.

The following projects are being handled by the committee:

No. 148. Causes and Cures of Pinholes and Birds-eyes in Coating.
No. 149. Properly Sized Body Stock for Coating.
No. 150. Factors Controlling Finishing on Supercalenders.
No. 151. Effect of High Temperature Drying on Coated Paper.
No. 152. Factors Controlling the Curl of Paper.

The following are members of the committee:

J. D. Davis, chairman, Dill & Collins, Inc., Philadelphia, Pa.
N. I. Bearse, Champion-International Paper Company, Lawrence, Mass.
Glenn Davidson, Aurora, Ill.
F. W. Egan, John Waldron Corporation, New Brunswick, N. J.
Werner Kaufmann, Kupfer Brothers Company, New York, N. Y.
W. A. Kirkpatrick, Allied Paper Mills, Kalamazoo, Mich.
J. A. Oechsle, Dill & Collins, Inc., Philadelphia, Pa.
R. A. Olson, Diamond Alkali Company, Painesville, Ohio.

Container Committee

J. D. Malcolmson, chairman of the Container Committee, reports as follows:

"The Container Committee has been working for the past several years on specifications covering the various methods of testing corrugated fibreboard and corrugated shipping containers. This has been partly due to the fact that there seemed to be more demand for these particular specifications and partly due to the fact that there has been very little demand for similar specifications on other types of containers. We wish to emphasize, however, that the Container Committee, being a subdivision of the main Consumers & Converters Committee, is equally interested in all forms of containers made of converted paper. This would include folding boxes, set up boxes, paper barrels and drums, paper baskets and the like. We wish to emphasize this in order to offset any criticism that our committee seems to be prejudiced in favor of work on corrugated containers and would welcome any request or suggestion for work on these other forms of containers.

"Our studies on the testing of corrugated board include caliper, bending, rigidity (compression), burst test, moisture content, and we are working very closely with a similar committee in the American Society for Testing Materials. The object of this collaboration, of course, is to avoid duplication of efforts and to avoid conflicting specifications.

"Our future plans are for continuation of these studies and in addition we contemplate investigations of rigidity tests on the component parts of corrugated board, national defense specifications, wax offset spray guns, new waterproof adhesives and waterproof containers for use in the export shipments."

The personnel of the committee is as follows:

J. D. Malcolmson, chairman, Robert Gair Company, New York, N. Y.
H. L. Bode, Gaylord Container Company, St. Louis, Mo.
T. A. Carlson, Forest Products Laboratory, Madison, Wis.
Pierre Drewsen, Hinde & Dauch Paper Company, Sandusky, Ohio.
C. E. Hartford, Southern Kraft Corporation, Panama City, Fla.
H. C. Koch, Anglaise Paper Box Company, St. Marys, Ohio.
A. W. Luhrs, Container Testing Laboratory, New York, N. Y.
Don L. Quinn, Chicago, Ill.
Hugo Schapiro, Ohio Boxboard Company, Rittman, Ohio.
John Van Ounsem, Pioneer-Flintkote Company, Los Angeles, Cal.
Albert Yraola, Hinde & Dauch Paper Company, Toronto, Ont.

Graphic Arts Committee

M. S. Kantrowitz, chairman of the Graphic Arts Committee, reports as follows:

"Graphic Arts is a comprehensive term now commonly accepted as pertaining not only to the fine arts but also to processes of printing, engraving, lithographing and bookbinding. The Graphic Arts Committee of TAPPI therefore has in its sphere a wide field for exploration.

"Historical: This committee had its origin in the formation in 1927 of a subcommittee for studying the ink resistance of printing papers under the chairmanship of E. O. Reed, then technical director of the United States Government Printing Office. Until that time most of the research work in paper testing was devoted to those properties of paper which are of greater importance to the paper maker than to the printer. The research work conducted by this subcommittee was the first consideration given by the Association for evaluating the printing qualities of paper. The first report of the subcommittee was made by E. O. Reed at the annual meeting in February, 1928. This report introduced the drop method and the oil flotation method for measuring the ink receptivity of absorbent papers such as mimeograph and newsprint. Modifications of these test methods have been used in several printing plants and paper mills for some years and have proved of value, in correlation with other factors, in determining printability.

"In 1932 B. L. Wehmhoff, then technical director of the United States Government Printing Office, on the resignation of Mr. Reed, assumed the chairmanship of the Subcommittee on Ink Resistance of Printing Papers. During that year several reports were

published by the Government Printing Office as part of the program of the Subcommittee in cooperation with the American Newspaper Publishers Association. A report on this work was made to TAPPI at its annual meeting in February, 1932. It included a discussion of the factors that might influence strike through, show through and flying ink. It summarized the research work on the grinding of news ink, changes in ink on standing, factors influencing printing qualities of newsprint, measurement of paper surface, ink absorption and effect of variation of percentage of sulphite pulp in newsprint. Specifications for newsprint and methods of testing news ink were recommended which proved of value to the newspaper publishing industry.

"In an effort to expand in the direction of studying problems involved in paper consumption, the association in 1933 formed the Converting and Consuming Division consisting of four committees. The Graphic Arts Committee under the chairmanship of Charles F. Clarkson of the International Printing Ink Corporation constituted one of these four committees.

"A Graphic Arts symposium was held at the annual meeting in February, 1933, to discuss the practical and technical problems which confront the consumers of paper. Papers were presented on the Bekk smoothness tester, the Gurley smoothness tester and the Bausch and Lomb opacimeter. A discussion on the application of ink to paper followed, and in this round table discussion the ink makers' point of view, the pressmen's point of view were presented and the responsibilities of the printing plant chemist were pointed out. This was the first meeting held under the jurisdiction of the Graphic Arts Committee and the Subcommittee on Ink Resistance of Printing Papers was subsequently merged with the functions of the Graphic Arts Committee.

"During the 1935 annual meeting of TAPPI a symposium was held on printing qualities of paper. Under the combined efforts of the Graphic Arts Committee and the Color Committee four papers were presented dealing with the physics of light, chemistry of color, psychological aspects of color and the practical application of color.

A discussion concerning the relationship between paper maker, printer and ink maker stressing the realistic rather than scientific approach to the problem, was advanced by the Graphic Arts Committee in 1936.

"In 1937 the Graphic Arts Committee brought forth several papers on aniline printing in which the process, machinery and inks employed were described and the possibilities of aniline printing machines for different purposes were briefly mentioned.

"No Graphic Arts Committee session was held in 1938, however, a symposium on smoothness and oil absorption of paper was conducted under the supervision of the Paper Testing Committee.

"C. F. Clarkson found it necessary to resign the chairmanship of the Graphic Arts Committee in 1939 and John Halladay of the Container Corporation of America assumed its leadership. At this annual meeting of TAPPI the Graphic Arts Committee shared its knowledge with the paper and printing industries in describing the art of preservation of records. It brought to the attention of the technical men of the paper, ink, printing and allied industries, the merits of the use of Dennison and K and N waxes, and of the Case ink and the I. P. I. gloss testing ink for evaluating certain printing properties of paper. An outline of other tests designed to evaluate the printing quality of papers prior to actual presswork was also presented.

"At the annual meeting in 1940 the Velo cold-set ink process in printing and its relationship to paper was discussed by the Graphic Arts Committee. Several newspapers have found it adaptable for printing their dailies.

"Considerable interest at this meeting was manifested by members of TAPPI in a discussion on dimensional changes in paper and on the psychology of color.

"In July, 1940, J. F. Halladay, because of a change in his position, resigned as chairman of the Graphic Arts Committee and was succeeded by M. S. Kantrowitz, the present Technical Director of the United States Government Printing Office.

"No definite program was formulated during the remainder of the year. The effort of the chairman was directed toward the arrangement of technical papers for presentation at the next annual meeting. Only those which would be of special interest as constituting new developments in the field of printing and allied industries were sought. From this viewpoint the Graphic Arts Committee contributed at the annual meeting in February, 1941, papers dealing with printing maps and charts, control of paper expansion in multicolor lithography, moisture content and moisture regain of coated papers, inks and their relation to paper and quick drying inks."

Current Objectives: "Since the appointment of the new chairman the committee has been reorganized and several names have been added to its membership. In addition to the reorganization of the general committee, two subcommittees have been formed, one to develop methods for testing the printing qualities of paper, and another to prepare a bibliography on the graphic arts. The Subcommittee on Testing Methods is under the chairmanship of W. F. Talbot of the General Printing Ink Company. Its purpose is to develop methods for more definitely correlating the physical characteristics of paper with its printing quality.

"When these methods have been promulgated by the subcommittee they will be referred to the Paper Testing Committee for consideration for adoption.

"The Subcommittee on Bibliography is under the chairmanship of Robert H. Simmons, associated chemist of the United States Government Printing Office. This subcommittee has been organized to prepare a bibliography of the most important technical articles pertaining to the Graphic Arts published during the past ten years in the various trade magazines. It is planned to prepare one such bibliography on the relationship of paper and ink to printing, and another bibliography on the various processes involved in printing.

"The Graphic Arts Committee of TAPPI has for its immediate objective the promotion of research on problems pertaining to the Graphic Arts. It also has for its purpose the collection and exchange of technical information and the results of research.

"With this in view the Graphic Arts Committee has on its program the following research projects:

I. The Development of Methods for Testing
   A. Surface Strength of Paper
   B. Oil Penetration of Paper
   C. Smoothness of Paper
   D. Resistance of Paper to Air Flow
II. The Preparation of Bibliographies
   A. Paper and Ink and Their Relation to Printing
   B. Printing Processes
III. Research on Effect of Humidity and Temperature Upon:
   A. Paper
   B. Ink
   C. Press Rollers
   D. Printing Processes
IV. Research on Covering Power of Printing Ink
V. Correlation of Laboratory Tests with Printing Quality of Paper

"In conclusion the Graphic Arts Committee is dedicated to scientific progress and out of such a comprehensive interest and excellent cooperation on the part of its members must come mutual benefits and a better understanding between paper makers, ink makers and paper users with resulting improvement in both the raw materials and the finished products of the Graphic Arts industries which are among the largest and most important industries in the world of today."

The personnel of the committee is as follows:

M. S. Kantrowitz, chairman, Government Printing Office, Washington, D. C.
R. M. Bates, Thomas M. Royal Company, Philadelphia, Pa.
J. W. Crosson, Mead Sales Corporation, New York, N. Y.
K. P. Geohegan, Aetna Paper Company, Dayton, Ohio.
R. H. Simmons, Government Printing Office, Washington, D. C.
H. B. Van Antwerp, Sinclair and Valentine, New York, N. Y.
B. L. Wehmhoff, West Virginia Pulp and Paper Company, New York, N. Y.

TAPPI Standards*

The Standards Committee was formed in 1933 for the purpose of establishing regulations governing TAPPI standards, editing and passing upon standards, and coordinating standardization activities within the Association and with other organizations.

Up to 1934 the Association had adopted 74 standards, largely testing methods. In the past seven years the Standards Committee has approved 24 new tentative standards and 8 new suggested methods; it has

*Report prepared by Roger C. Griffin, Arthur D. Little, Inc., Cambridge, Mass. Chairman, TAPPI Standards Committee.

An open letter to the members of TAPPI

There are a couple of old timers in our organization whom we used to call the "broom-stick boys." Undoubtedly every paper mill has had men like them. To their undying credit they were good. They were true artists and craftsmen. With no more equipment than a keen sense of touch and sound, a love for their "art" and a long broom handle, the results they achieved were remarkable.

When they dipped their hands into a beater to feel how greasy the stock was, and listened to the hum of the beating tackle through the vibrations in a broom stick held against the beater roll shaft—to detect by the pitch of the hum how hard the tackle was beating—and then said, "Okay, Joe, Dump it," you knew the preparation of the stock was just about right.

But great technological strides have been made. With no reflection on the ability of the old time papermakers, for their craftsmanship is needed just as much now as ever before, the tremendous advances made in the use of paper and the exacting performances demanded of it require the most accurate and scientific controls—if paper is to keep pace with the parade.

These controls have been supplied and are constantly being added to by the members of your great organization and other technical experts. Through your skill papermaking has not only kept up with developments in all fields in which paper is used, but in many instances you have kept it out front, anticipating new requirements and devising better techniques.

We, like others, have profited in many ways through the work of Tappi, and we are glad, in this way, to express our gratitude publicly. You have a brilliant record in your hands—but remember, also, you have a great tradition behind you—and an even greater challenge ahead.

P. H. GLATFELTER CO.

Paper Manufacturers

SPRING GROVE, PA.

approved the advancement of 29 tentative standards to official and of 2 suggested methods to tentative standards; and has also approved revisions of 41 standards.

In the early days of the association its standards were published in the *Paper Trade Journal* in whatever form they were submitted by the various committees. This naturally resulted in considerable nonuniformity. The Standards Committee has established regulations clearly defining a uniform procedure for preparing and presenting TAPPI standards and suggested methods and for identifying them for subsequent publication in loose-leaf form for the convenience of members and others interested. A serious effort has also been made to review all previous standards for the purpose of making such editorial changes and corrections as seemed desirable. To this end 79 standards have been edited, corrected and republished in loose-leaf form.

With the formation of committee D-6 on Paper and Paper Products by the American Society for Testing Materials the standards committee increasingly realized the importance of cooperation and coordination of the standardization work of the Technical Association with that of committee D-6, particularly in paper testing. The outcome of its efforts in this direction was the formation in 1937 of the ASTM-TAPPI Joint Paper Testing Committee.

It is the aim of the standards committee, where there is the need or an expressed desire in the industry for a particular standard testing method, recommended practice or specification, to further the preparation of such a standard through the appropriate TAPPI committee. The chairman of the standards committee welcomes criticisms, suggestions or inquiries regarding standards.

The TAPPI Monographs

Beginning this year, 1941, the Technical Association will issue a series of monographs on subjects dealing with the operation, engineering and technology of pulp and paper manufacture.

The textbooks on the Manufacture of Pulp and Paper serve a real industrial need in outlining with considerable detail the processes commonly used. For obvious reasons these volumes must be limited as to the amount of detailed information to be included. Such information should, however, be made available and it is the intention of the association to issue separate publications covering in as much detail as possible subjects of interest.

The first of these publications has been prepared and will be issued this year. The preparation has been under the direction of the TAPPI Water Committee, under the chairmanship of Lewis B. Miller of the Keasbey & Mattison Company, Ambler, Pa. It will deal with water for process and boiler feed in the pulp and paper industry.

Other monographs are being developed by individuals. Eventually there should be a series of such books which will present important details regarding restricted phases of the industry's technology.

. . . Our greetings and a salute

to TAPPI, the industry's

partner in progress - - -

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